

THE IRON AGE

MARCH 8, 1928

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The first was installed April 1926 and the fifth, October 1927

2700 Rockwells are now in use—
Specifications in Rockwell Hardness are
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WILSON-MAEULEN COMPANY INC.

738 East 143rd Street

New York City



(*The New*)

KOPPERS BUILDING

A 32-story building is being built for the Koppers Company in Pittsburgh. This structure will be the tallest office building in Pittsburgh and will be a splendid expression of modern design and efficiency.

The site of the building at Seventh Avenue and Grant Street is easily accessible to the Union Station, prin-

cipal car and bus lines, the boulevards and the proposed new Post Office.

Architects are Graham, Anderson, Probst and White with E. P. Mellon as Consulting Architect.

Completion is promised for January 1929. The Koppers Company will occupy the fourth to fifteenth floors and the balance of the building will be available for desirable tenants.

THE KOPPERS CONSTRUCTION CO.

Chicago

PITTSBURGH, PENNSYLVANIA

New York

THE IRON AGE

New York, March 8, 1928

ESTABLISHED 1855

VOL. 121, No. 10

X-Rays: A New Tool in the Foundry

Examination Before Machining Reveals Hidden
Defects and Reduces Foundry Costs—
Two Cases Cited

ONE of the greatest problems of the foundryman is the reduction of costs by the elimination of faulty castings. A great deal of progress has undoubtedly been made along this line in the past, especially in the case of the larger foundries which have found it feasible to conduct extensive research.

The employment of trained scientists and metallurgists, however, is not always practicable for the smaller organizations and, even by the best metallurgical practice, it has not been possible generally to prove the existence of a great many defects in castings until the specimen has been actually worked up.

Quite early in the history of X-rays, their use was indicated as a possible help in examining objects other than the human body but, until recent years, such work was not applicable to metallurgy on a very large scale, because of the fact that the production of X-ray equipment was not along lines most adaptable for such study. In recent years, though, because of the production of equipment capable of delivering X-rays of considerable penetration at a reasonable cost, there has been a more detailed study of their possibilities in industrial work.

During the war this method was utilized to some extent in the examination of munitions and equipment.

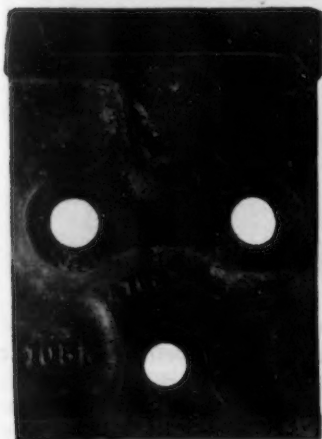


Fig. 1 (Above)
—A Steel Casting Picked at
Random for X-
Ray Examination

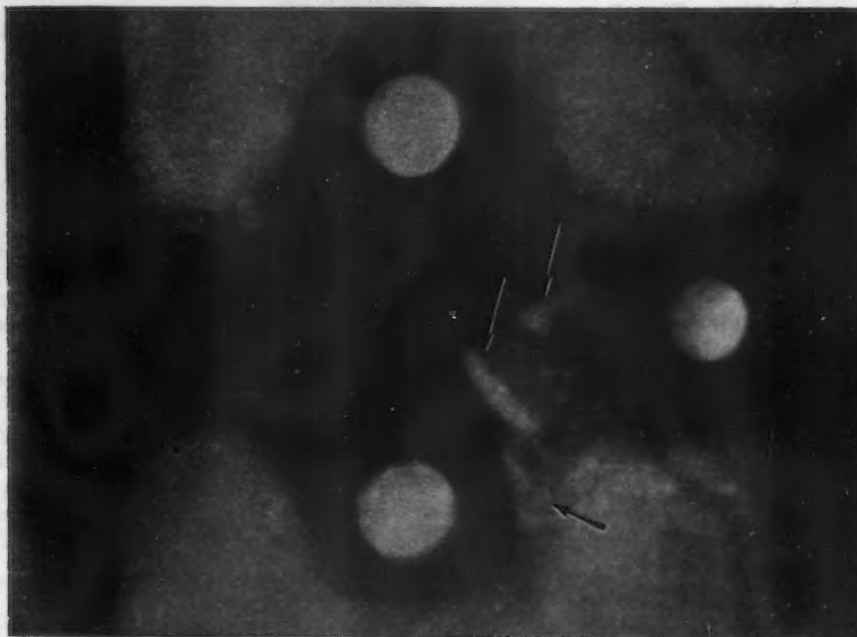


Fig. 2 (Above)—Reproduction of X-Ray Picture of Casting. Fig. 3 (left)
—Defects located and revealed by X-rays

Since the war this work has progressed in several places and has resulted not only in the raying of relatively thick castings, but has demonstrated that there is a wide use for X-rays produced by relatively low-power equipment.

It will probably be possible, with quite simple equipment, to save a great deal of expense in the average foundry through the detection of faulty castings before they are delivered and worked up.

In the medical world the interpretation of X-ray shadows in the human anatomy has reached an exact



*Fig. 4 (Above)—
An Aluminum
Casting and a
Portion, Fig. 5
(Right) of the
X-Ray Picture
Showing Location
of a Defect*



stage and it seems likely that, in the course of a few years, an analogous situation will exist in the case of X-rays in industry, with the added advantage that in this work the subject can be cut up and examined at will to confirm diagnosis.

Defects Which Are Uncovered

With gray iron or steel castings it is now possible to X-ray through a thickness of $3\frac{1}{2}$ in., and, when it is considered that there are a vast number of castings in which the over-all thickness of actual material does not reach this figure, the wide application is appreciated. Such flaws as blow-holes, cracks, bubbles and foreign material are relatively easy to detect in one or two exposures on a modern X-ray film.

In the case of aluminum alloy castings, of which more and more are being used, X-ray equipment of low cost can be utilized to great advantage. To date there have been several laboratories equipped to do this work on a consulting basis, notably the United States Government arsenal at Watertown, Mass.

Some Actual Results

A few illustrations will show concretely just how this method works out.

Fig. 1 represents a casting picked at random from a run made under usual conditions.

The X-ray "picture" is shown in Fig. 2. It will be noticed that there is a light area running diagonally across the shadow. This indicates the presence of a flaw.

Fig. 3 indicates the same casting shown in Fig. 1, after it has been sawed in order to reveal the flaw indicated by the X-rays.

In Fig. 4 is shown a complicated aluminum casting which must be subjected to high pressure in actual use. Any flaws in such a casting would possibly endanger life and cause a serious loss of product. It is, therefore, necessary that these be produced as nearly flawless as possible.

This casting, when X-rayed, showed flaws such as are reproduced in Fig. 5. On sawing the casting, as indicated by the X-ray findings, these flaws were found and changes in casting technique recommended.

Examining the First Run of Castings

From these few examples it will be appreciated that here is available a new tool in industry. Its utility lies not entirely in its routine use for testing, but in its application for studying representative samples of first runs of a given type of casting. It is to be regretted that there is of necessity some loss in detail in reproducing the original negatives.

Through studying the findings and improving technique, it should be possible to have resulting castings practically free from flaws.

When it is considered that in many cases, particu-

larly with fairly elaborate castings, a great deal of machine work may be put on them before the defect shows, it will be seen that, if such work can be saved, the primary cost of the examination will be negligible.

A foundry giving such service will be preeminently ahead of its competitors, and the user of the casting will be correspondingly better satisfied. The tests of the castings were made by the X-ray department of The Eastman Kodak Co., Rochester, N. Y.

The Standard Alloy Co., Cleveland, recently organized, has established a plant at 1679 Collamer Road and will make nickel-chrome alloy for use in heat-treating furnaces, carburizing boxes and other castings requiring the heat-resisting metal. The officers are F. R. Williams, president; F. F. Jackson, vice-president; Emerson Williams, treasurer; H. M. Smith, vice-president in charge of sales, and J. H. Williams, secretary.

Members of the Worcester section American Society of Mechanical Engineers will inspect the plant of Graton & Knight Mfg. Co., Worcester, Mass., on Thursday afternoon, March 8. A technical program will follow the plant visit.

Recovery of Non-Ferrous Scrap

Methods of Cleaning and Smelting Waste Metals, Skimmings and Slags from Copper, Brass, Bronze and Aluminum Foundries Discussed by Metallurgists

A NUMBER of papers on secondary metals constituted one of the features of the Institute of Metals' program, when it met Feb. 22 with the Mining Engineers. To illustrate the little-appreciated importance of this industry, J. P. Dunlop, statistician United States Bureau of Mines, Washington, presented data on "Non-Ferrous Secondary Metals Recovered in the United States."

Collection and Segregation of Material

FRAGMENTARY statistics were first collected in 1907 when a partial return on copper, lead, zinc and tin showed a recovery of 77,658 tons of metal valued at \$17,196,436. The scope of the inquiry was broadened, and in 1917 (a year of high prices) nearly 300 million dollars worth of metal was recovered, more than the combined value of gold and silver production! Evidently figures on scrap recoveries are no less essential in appraising the metal market than are data on primary metal consumption. Details are included in the table.

The proportion of secondary metals to the metals produced from domestic ores varies considerably from year to year:

	1915	1921	1926
	Per Cent	Per Cent	Per Cent
Copper	28	86	55
Lead	15	25	41
Zinc	19	39	23
Aluminum	27	33	60

High returns in copper after the World War were due to large imports of scrap from Europe. Lead has been increasing recently because of more general use of lead storage batteries. The figures for zinc do not include the dross, ashes and skimmings converted annually into zinc oxide and chloride, and containing 25,000 to 30,000 tons of metal.

Most of the tin recovered as metal is from drosses; solder, babbitt and bronze accounts for the tin as alloys. About 1142 net tons of metallic tin and 2047 tons of tin in chemical compounds were recovered in 1926 in the detinning plants of the country, treating scrap tin plate and clippings. Some 30,000 tons of ingot tin are used in making tin plate. Nearly all of it is wasted, as it costs more to collect old tin cans than the impure steel scrap and tin recovered are worth.

Sampling and Evaluating Copper-Bearing Metal

It is obvious that one of the most difficult problems connected with the marketing of valuable wastes is to determine the average metal content in a mixed lot. T. A. Wright, of Lucius Pitkin, Inc., New York, discussed this matter. He said that even when copper castings are carefully selected, they will be found to assay from 88 to 99 per cent copper. Metallic scrap, bundled or in large pieces, can only be sampled by hand picking a representative portion, satisfactory to both buyer and seller. Fine materials like borings, powders and ashes may be better sampled during unloading, either with automatic quartering cones or by reserving every tenth shovelful. Mr. Wright also gave approved methods of drying the sample and burning off oil and grease. During this operation, lead and low melting portions accumulate and can be rejected. Iron is usually removed by a magnet. Before cutting down a sample of fine material, it is frequently ground in a miller, after which the fines may be rejected. Copper-bearing materials thus prepared are then usually

melted in a gas-fired crucible furnace, and the resulting slab drilled for chemical analysis.

Tin, Terne and Zinc Skimmings

Sampling methods on the above vary almost as much as assaying methods, depending upon the kind of material. Tin and terne drosses are often in the form of thick, wet sludge. After the sample is dried, it is ground and the relative amount of fines and metallic scales remaining on a 40-mesh screen determined. Proportionate amounts are mixed with flux and melted; settlements are made on the amount of metal resulting from this fusion. From 4 to 15 per cent tin may be lost in the slag, which is ignored, but it is claimed that this is approximately the loss to the smelter.

Zinc drosses are usually sold on "sample," which is often a grab sample. Settlement is made on the total zinc as determined by chemical analysis; sometimes penalties are exacted for chlorine contained.

Salvage in a Manufacturing Plant

H. F. Seifert, assistant superintendent Westinghouse Electric & Mfg. Co., East Pittsburgh, emphasized in a brief paper entitled "Classification and Preparation of Non-Ferrous Scrap Metals and Alloys," that these operations are not difficult, in fact, a very simple task when in the hands of the right man. He listed 96 different kinds of alloy scrap produced in his plant. Each machine is supplied with tote pans for the scrap produced, which is duly tagged, collected promptly, weighed, appraised and placed in suitable bin storage. The various manufacturing departments have an interest in the matter because they receive sizable credits for the material recovered. A large salvage department will find it profitable to operate a washery to remove oil and grease from metals, magnetic devices to separate tramp iron, an alligator shear to trim off soldered ends, etc., and a baling machine. Using such tools the grade of the scrap can be raised more than enough to pay for the operations.

Contamination of Metal Scrap

If sellers of scrap are to receive the most for their material, extra care must be taken to avoid contamination, in the opinion of Carl O. Thieme, chief chemist Michigan Smelting & Refining Co., Detroit. He noted five principal sources of contamination:

1. New and unusual alloys (such as hardened aluminum, lead and copper) will introduce unlooked for elements into the recovered metal.
2. Productive methods causing mixed metals. Soldered copper radiators or cable ends, bronze welded copper and electroplated articles are instances.
3. Carelessness in handling scrap from various machines and departments will cause trouble, and is inexcusable.
4. Ignorance on the part of laborers is subject to correction.
5. Unsuitable methods of refining will fail to remove undesirable elements.

Consequently, contamination can only be controlled by care at the point of origin of the scrap, skill in assembling it for smelting and proper knowledge and equipment in furnace practice. While it is well known that aluminum must be absent in metal for pressure valves, and sulphur must be very low in nickel-silver castings for the plumbing trade, the speaker voiced the opinion that users of secondary metals were uselessly penalizing themselves by demanding very low percent-

ages of certain elements in ingots, when several times as much would cause no harm for ordinary uses. As an instance, most specifications require lead to be below 0.35 per cent in tin-base babbitt, but makers of high-grade automobiles are now accepting lead up to 1.5 per cent, which analysis can be had for a considerably lower figure.

Production of Ingot Brass and Bronze

COMPOSITION brass ingot manufacturers apparently are able to meet standard specifications easily. Walter F. Graham, Ohio Brass Co., Mansfield, Ohio, gave the following averages for his receipts during 1926, a total of 63 carloads:

	Alloy A		Alloy B	
	Specifica- tion Per Cent	Average Delivery Per Cent	Specifica- tion Per Cent	Average Delivery Per Cent
Copper	79 to 81	79	83 to 85	84.5
Tin	2.5 to 4	3.4	2.5 to 4	3.7
Lead	6.5 to 7.5	7.4	2.5 to 3.5	3.6
Zinc	9.5 to 10.5	9.9	9.5 to 10.5	8.0
Iron	0.25 max.	0.14	0.25 max.	0.08
Antimony	0.25 max.	0.12	0.25 max.	0.10

In order to reduce the amount of non-metallics in secondary ingots, and to reduce the number of leaky castings made therefrom, it is necessary for the smelters to standardize their practices. At present furnaces ranging from 1 to 50 tons in capacity are in use. Some Bessemerize the impurities; others attempt to flux them. Wide variations in quality of output are consequently inevitable.

Don C. Blackmar, superintendent Great Western Smelting & Refining Branch of Federated Metals Corporation, Detroit, defended the secondary smelter, saying that he was paying more for the scrap and selling higher grade ingot than ever before, and consequently could not run anything but an efficient and economical business. Copper ingots are made following practice in the Lake Superior copper smelters. Brass and bronze ingots are made in reverberatory furnaces up to 30-ton capacity. Charges are properly fluxed; other impurities are removed by stirring with green poles or metallic deoxidizers. Metal is held in the furnace until a laboratory analysis shows correct analysis. Mr. Blackmar said that most foundrymen are able to make better castings from ingots prepared in this way than from alloy melts made by them from virgin metals.

Should a Bronze Foundry Attempt to Smelt Furnace Skimmings?

Methods used by most bronze foundries to recover metal from slag produced in open-flame furnaces were discussed by E. R. Darby, chairman of the meeting (metallurgist Bostwick Lyon Bronze Co., Chicago). It is usual to find them crushing the skimmings, when a large percentage of the entrapped metal can be recovered by water concentration on a table or jig. However, tin, the most expensive raw material bought, experiences the highest loss because it oxidizes easiest, and goes into the slag, where it is wasted in the tailings, diluted in the foundry sands or lost in sweepings.

He recommended that every bronze founder investigate this problem carefully. It can be done by accumulating dross, skimmings, slag and other wastes for one week. Weigh and sample the accumulation care-

fully and figure the pounds of valuable metal contained. Then concentrate this amount in the usual way, weighing, sampling and analyzing the various products so a metallurgical balance sheet can show how much of the metal is actually recovered.

In one plant melting 50,000 to 80,000 lb. of bronze a day where such a scheme was tried, it was found that the wastes amounted to 16,500 lb. in a week, three times as much as was supposed. From this pile 682 lb. of metal was recovered by concentration, analyzing 6.2 per cent tin. The tailings, however, contained 400 lb. of copper, 105 lb. tin and 40 lb. lead. A small blast furnace was installed at this place. In one year it smelted 140,000 lb. of slag and recovered 41,300 lb. of metal. If the slag had merely been concentrated, the recovery would only have amounted to 21,300 lb., thus showing that the new method practically doubled the savings.

Before such a small smelting plant is installed in a foundry, a very careful investigation of the costs of operation should be made, in the opinion of E. E. Thum, associate editor THE IRON AGE, New York. Intermit- tent and small-scale operations are seldom economical, and require a skilled personnel and accumulated experience not often contained in the foundry staff. Consequently, it will nearly always prove better to collect the drosses and sell them to smelting companies than to treat them in special furnaces on the spot. If the returns from the sale do not warrant the cost of collection, it will usually be best to throw them away altogether. This is especially true where there is more than one smelter within shipping range, so quotations can be compared.

Remelting Secondary Aluminum

A LENGTHY paper on this subject was presented by T. D. Stay, D. B. Hobbs and H. O. Burrows, Aluminum Co. of America, Cleveland. In it they defined secondary metal as that which has lost its original identity as to source. Most of it reaches the consumer in the form of "remelt ingot" or "remelt No. 12 ingot," and its principal difference from primary ingot is the less accurate control of composition, and the probability that it contains some dross and oxide.

Classification of Aluminum Scrap

The authors define the sources of the scrap as follows:

Clip and Sheet; from utensil makers and automobile body works.

Foil; sheet 0.0002 to 0.0005 in. thick, clean or coated.

Cable; "clean" if uncorroded; "dirty" otherwise.

Castings; pure or alloyed. Little of this comes from foundries, because they remelt their own scrap. Classified as (1) "clean," castings never in use; (2) "dirty," reclaimed from machinery; and (3) "dirty scrap, cleaned."

Borings, turnings and sawings; machine shops convert 10 to 12 per cent of rough weight of castings into fine particles. Its value depends upon its cleanliness.

Skimmings; from melting pots, varies widely in metal content.

Grindings and buffings.

Sludge; residue from refining operations, usually worthless.

SECONDARY METALS RECOVERED (NET TONS)

	1917	1921	1924	1926
Copper (including that in alloys other than brass) ..	159,400	113,350	196,500	281,700
Scrap brass remelted	320,000	148,500	274,000	283,000
Lead as metal	45,100	46,370	90,400	125,000
Lead in alloys	48,400	57,410	114,100	152,300
Zinc as metal	31,400	33,833	58,886	64,570
Zinc in alloys other than brass	4,800	5,840	10,500	13,430
Tin as metal	6,000	5,400	7,700	9,750
Tin in alloys and chemical compounds	13,400	11,500	23,600	23,650
Antimony as metal	6	29	90	2,910
Antimony in alloys	4,955	4,691	9,314	13,320
Aluminum as metal	6,660	3,650	10,350	20,500
Aluminum in alloys	9,440	5,250	16,650	23,700
Nickel as metal	60	86	114	485
Nickel in non-ferrous alloys and salts	800	859	2,126	2,565
Total quantity	650,421	436,768	814,330	1,016,880
Total value	\$295,854,900	\$89,140,500	\$200,578,600	\$274,540,900

Dross; aluminum oxide and metal from a fluxing operation.

Prices that dealers are willing to pay for such scrap in comparatively small quantities vary with market conditions. In general, No. 12 remelt ingot will sell at about 4c. per lb. below 99 per cent virgin ingot. Clip will bring 7½c. below virgin ingot, clean scrap castings 10c. below, and borings 15c. below virgin ingot.

Remelting Secondary Aluminum

In order to get a good recovery of metal it is necessary to remember that all aluminum is coated with a layer of oxide, heavier on old material than on new, and in order that the melted metal may coalesce, this oxide skin must be removed or broken through, and prevented from reforming. Solid metal added to the melt should therefore be pushed down through the scum, so it will not be trapped and prevented from coalescing. This is especially necessary when handling borings; this finely divided metal can be partially separated from the honeycomb-like oxide by stirring or puddling, but this is more properly the function of the flux.

Fluxes are of three varieties: (a) those like common salt which are merely a covering to exclude air; (b) those like alkali double fluorides which actually dissolve the oxide; and (c) those like zinc chloride which evaporate readily and are useful mostly for mechanical effects.

Cleanliness is the principal requirement for secondary aluminum. Briquetting not only reduces the cost of handling borings some 40 per cent, but also improves the recovery by 6 per cent. If they have been cut with a water soluble, alkaline base compound, they should be washed and dried within a few days in order to pre-

vent disintegration of the metal. When melting, start with a pot one-third full of remelted ingot. Add the borings slowly, and stir in with an iron bar (either by hand or by a mechanical puddler), continuing until the pot is nearly full. Then add a generous portion of mixed zinc chloride and cryolite, stir and settle. Skim and pig out two-thirds of the metal and repeat the operations.

Recovery of Metal from Skimmings

Skimmings should be ground, screened and freed from iron. Then add it slowly to a pot one-third full of molten ingot metal, stirring it in until the whole mass is pasty. The pot will then be about half full. Then add a little flux and fill the pot with skimmings without stirring. After some time has passed and the whole mass is thoroughly heated, resume stirring with a hook-shaped flat bar, driving the hook to the bottom, turning the hot skim over the cooler top crust and breaking up all lumps. The charge now consists of a puddle of molten metal with oxide and dirt on top, and looks like red-hot sand containing beads of metal. Now sprinkle on a mixture of 85 per cent cryolite and 15 per cent zinc chloride, and stir it in. This causes the dross to glow, apparently becoming white hot and having a tendency to ball up. Keep stirring, breaking up these balls until the whole mass cools to a bright orange color, when the scum becomes powdery and can easily be removed with a perforated skimmer, rapping each skimmerful on the edge of the pot to shake out droplets of metal. If an inclined, corrugated plate can be placed on a vibrating mechanism and the dross spread along its top edge, a little more metal can usually be shaken out.

Disk Rolling With Special Reference to Steel Differential Cases

A NEW method of steel working is found in the production of parts such as the new type steel differential case used by a leading manufacturer of automobiles. The machine for radially rolling this section was designed and built by the Aetna-Standard Engineering Co., Youngstown, Ohio. As designer of tube-making equipment, the company found a relationship between rolling radially and the diagonal rolling common to all piercing machines.

Machines rolling radially consist of two separately motor-driven disks, the axes of which are placed angularly. One roll is fixed and carries the work piece. The roll opposite is pushed on to the work by a motor-driven screw arrangement, and is withdrawn by compression springs.

Blanks used are forgings made on an upsetting machine. Each blank has the hubs formed to suit the finished disk and the hole pierced for the proper diameter bore. The rolling machine has a production of about 10 disks a minute. The blanks are heated before rolling.

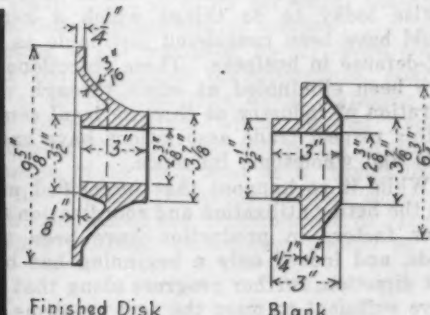
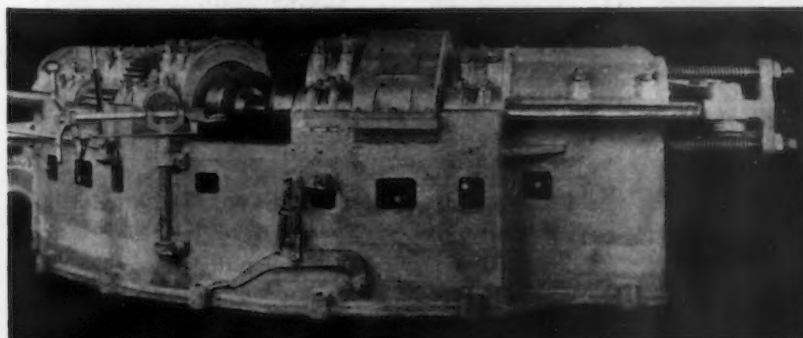
The blank is put on a hinged holder and is then placed on the centering pin of the fixed disk. A foot treadle on the front of the machine operates the screw clutch at the back and controls the forward movement

of the disk. As the disk comes forward, rolling contact is made with the blank on the full radial length of the skirt. By compression the thickness is reduced and the diameter enlarged until the proper dimension is secured.

The centering pin on the fixed disk serves as a knock-out. Upon withdrawal of the movable roll, the finished disk is ejected and the restriking and trimming operations follow in a press without reheating.

Rolls are designed to give the proper speed relation to prevent distortion on the work piece as it is radially displaced. Each disk is driven by a motor of 150 hp., direct connected to the pinion shaft. Disk and pinion shaft bearings are mounted in roller bearings, excepting the thrust bearing on the disk shaft, which is of the conventional collar type.

Provision for lubricating has been made so that forced or gravity circulation is possible, which gives the best operating condition where anti-friction bearings are used. All parts subjected to stress are steel and where under severe strain are made from alloy steel heat-treated. The bed is a semi-steel casting made in one piece, so that maximum rigidity is built into the machine as a unit.



Disk Rolling Machine Equipped With Motor-Driven Disks, Placed at an Angle With Regard to Each Other and Driven Separately. At right is an example of the work done, showing how the arbor diameter and depth are maintained, while the rim is spun out to a much greater diameter and thinner section

New Competition More Constructive

Trend Is Away from That Which Has Brought Low Profits, Says Magnus W. Alexander at Cincinnati Conference on Industry's Problems—More Efficient Distribution May Relieve Economic Pressure

ECONOMIC problems affecting American industry were discussed exhaustively at a round-table conference at the Hotel Gibson, Cincinnati, March 1 and 2, in connection with the annual meeting of the Cincinnati branch of the National Metal Trades Association. The conference was conducted by the National Industrial Conference Board, Inc., under the leadership of Magnus W. Alexander, president of the board.

At an afternoon session on Thursday, March 1, the movement and relationship of wages and prices were studied, while public expenditures and taxation also were topics. In the evening the Cincinnati branch held its annual dinner meeting at which the agricultural problem and ways and means of remedying the present condition of so-called "profitless prosperity" were considered. The conference was concluded on Friday morning, March 2, with a discussion of industrial relations activities.

"Profitless Prosperity" Due to Sharp Competition

Sharp competition, not lack of business, is at the bottom of what has been called "profitless prosperity," declared Magnus W. Alexander, chairman of the board, in an address on "The Paradox of Profitless Prosperity." Competition is making itself felt to such a degree that in recent years about two in every five manufacturing corporations have either made no profits or have incurred a deficit. During the six-year period, 1920-1925, for every \$100 earned by successful concerns, \$32 was lost by unsuccessful companies.

The course of business failures and of new incorporations in the United States is worthy of note in this connection, explained Mr. Alexander. It is to be expected that the time during which the number of business failures is increasing will be the time during which business will be more difficult to conduct and in which there will be less incentive to launch new business enterprises. Since the end of 1925 the competitive struggle has been increasing and at present the insolvency record is near the high level reached following the depression of 1921.

Pointing to a double paradox in the present business situation, Mr. Alexander said that there is today great national prosperity with great business activity, but a competitive struggle which has resulted in precarious profit margins. Moreover, the very method which has contributed so much to our national income, namely, efficient mass production, is the factor which is accentuating the competitive struggle.

Trend Now Toward Constructive Competition

One of the encouraging signs, according to Mr. Alexander, is the trend toward constructive rather than destructive competition. It would be both unethical and unwise today to do things which a generation ago would have been considered justifiable as measures of self-defense in business. These objectionable practices have been eliminated as much through voluntary co-operation of industry as through legal compulsion, and in this respect trade associations have exerted a powerful and wholesome influence.

While it so happens that intensified mechanization and the better utilization and coordination of labor with other factors in production have been the principal needs, and indeed only a beginning has been made in that direction, further progress along that line may not prove sufficient to meet the new problems. Instead, it may be that the development of more efficient methods in the process of distribution will do much to relieve that economic pressure which increased competition is exerting. Mr. Alexander emphasized the fact that "much of what has been gained by achieving low unit

cost of production is lost by the high cost of distribution."

The present plight of the farmer was outlined by Charles Nagel, St. Louis, Secretary of Commerce and Labor in the cabinet of President Taft. Mr. Nagel said that it was impossible for one legislative act to cure all of the agricultural ills and that it would take the combined cooperation of the Federal, State and local governments to aid in farmer relief.

Wages Have Reached Equilibrium

Wages in the United States probably have reached a point of equilibrium and cannot be expected to rise much higher without tending to increase the volume of unemployment, stated Virgil Jordan, chief economist of the National Industrial Conference Board, in discussing at the Thursday afternoon session "Wages and Prices—Their Movement and Relationship." The only factor that would disturb the wage situation would be an upward trend in commodity prices. Mr. Jordan pointed out that the high wage level in the United States is primarily due to three factors: the restriction of immigration, which has tended to eliminate a large labor reserve; higher standards of living among wage earners, which has tended to restrict the rapid increase of population; and the enormous volume of savings, combined with an abundance of technical knowledge and business talent, which has created an intense competition among investors and enterprises, as well as producers of raw material, from all of which the wage earners in certain manufacturing industries have benefited.

The level of wages, declared Mr. Jordan, depends upon the relative abundance of labor, on the one hand, and of capital, technical skill, business ability and raw materials, on the other. Immigration restriction and new standards of living have brought about a relative scarcity of labor in comparison with capital, technical knowledge, business ability and raw materials. The result has been that the average hourly earnings of industrial wage earners are about 133 per cent higher than before the war; the average yield of high-grade industrial securities is today at, or somewhat below, the pre-war level; men of technical training have difficulty in selling their knowledge at much above pre-war salary levels, and the competition among the vast majority of small business concerns is ruinously intense, while the producers of raw material, from the farmers to the coal operators, are either losing money or making little more for their investment and labor than before the war.

This process has gone so far that the expansion of mechanical equipment and the use of labor saving devices have gradually displaced labor in many of the important industries. Though a portion of this labor may have found work in some of the newer subsidiary occupations, it is likely that the labor reserve has slowly tended to grow since the end of the war, despite the enormous expansion in production and trade. Certainly employment in manufacturing industries has not only failed to keep pace with the growth of production, but has actually declined.

Problem of Future Is to Expand Consumer Purchasing Power

Mr. Jordan expressed the opinion that the main problem of future prosperity in the United States is that of expanding the domestic consumer purchasing power concurrently with the growth of production capacity. Employers have appreciated this problem, but have felt that high wages would solve it. High wages, according to Mr. Jordan, are not in themselves a guarantee of permanent prosperity, because it is not wage

levels themselves that determine consumer purchasing power, but rather the relation of wages to prices and to employment. Wages may remain stable or even decline, while the purchasing power of the wage earning public is increased by falling prices or expanding employment. Prices can be reduced and employment increased only if there is sufficient incentive for saving and business enterprise, in the form of good returns on investments and of fair business profits.

"In the period since 1925," said Mr. Jordan, "falling prices of manufactured products, combined with rising prices of raw materials and high wages, have tended to put a damper upon business enterprise, to penalize the investor and to make prosperity exceedingly uneven and not widely diffused. Labor has become a fixed charge upon American industry, while profits and interest, as well as return to the producer of raw materials, have become a contingent charge—that is, they have had to take what they could get, which in some industries has been very little.

"The expansion of business in the future will depend upon whether we can find some way of increasing consumer purchasing power in greater proportion than we increase wages or volume of production. The use of banking credit for installment selling has done this in recent years, but the effect cannot be maintained without increasing the dose. The automobile industry has been a most important factor in expanding the purchasing power of consumers and it may continue to be so for some time to come. But, above all, this country needs some new incentive to business enterprise, such as the automobile industry originally afforded and such as will lead to the creation of new industries as large and as important as the automobile industry. Anything that will increase the agricultural purchasing power will make for business expansion in certain lines, although it may tend to cut business profits in others using agricultural raw materials, if wage levels remain high. Apart from such factors, the most important influence for business expansion would be the use of our enormous credit resources for the building of public works and the increasing of highway and transportation facilities, all of which add to the general consumer purchasing power, but do not augment, either directly or immediately, the volume of consumer goods in the market."

Tax Burden Due Frequently to Waste and Extravagance

American taxpayers today are bearing the heaviest peace-time burden of taxes this country has ever known, despite the considerable reductions effected by the Federal Government, stated W. J. Shultz, financial economist of the board, in an address on "Public Expenditures and Taxation." Expansion of the functions of State and local governments, waste and extravagance and lack of centralized control and organization on the part of local governments were cited as the chief causes of the increasing tax burden.

Mr. Shultz brought out the fact that a large portion of current expenditures is being financed by borrowing, most of which has been done by cities and urban communities. Of the total amount of money borrowed by State and local governments from 1923 to 1926 inclusive, the States were responsible for 15 per cent, the counties for 16 per cent, the school districts 13 per cent and the municipalities 56 per cent. The purposes of these borrowings in the order named were municipal improvements, roads, streets, bridges, schools and other miscellaneous purposes. The result of the excessive use of the borrowing power possessed by local and State governments will be a higher tax rate in the future.

"The crying need of State and local governments at present is a good healthy injection of the methods of practical business procedure that have brought American industry to its high grade of precision and workmanship," said Mr. Shultz. "The remedy for this situation is twofold. In the first place, reorganization of State and local governments with a view to greater efficiency of operation is essential. In the second place, there is a need for a centralized supervision and even control of finances of the local governments, which are the worst offenders. State and local taxes absorbed

about one-fifth of the net income of Ohio corporations during the period from 1922 to 1924."

Industrial Relations Activities Getting Away from Paternalism

The tendency in the evolution of industrial relations is away from welfare work and paternalism and toward self help and intelligent cooperation, declared J. A. Morford, chief of the field research staff of the board, in discussing "Industrial Relations Activities and Experience in American Industry." Mr. Morford said that plans for industrial relations are designed to take the place of the personal contact and the intimate relationship between employer and employee which modern industrial organization has made impracticable. The rapid expansion of many industrial establishments during the war brought with it a hasty increase in industrial relations activities, many of which later did not stand the test of normal conditions. The fact that many plans had to be abandoned, however, is no criterion of the desirability or the efficacy of industrial relations programs in general. Among the activities which have proved successful in operation in recent years are supplemental bonuses, employee stock purchasing and other thrift plans, group insurance, industrial pensions, with a tendency toward contributory plans, foreman training of foremen, councils of workmen, job analyses, scientific hiring and discharging of workmen, health and accident analyses, medical care and reduction in turnover.

Cincinnati Branch Reelects E. A. Muller President

E. A. Muller, president and general manager King Machine Tool Co., was reelected president of the Cincinnati branch of the Metal Trades Association at the annual business meeting late Thursday afternoon. Other officers selected for the coming year are: Charles Fox, Ahrens-Fox Fire Engine Co., vice-president; George Seyler, Lunkenheimer Co., secretary; H. L. Feldbush, Worthington Pump & Machinery Corporation, treasurer; George Schiele, Cincinnati Milling Machine Co., Richard LeBlond, R. K. LeBlond Machine Tool Co., and August Marx, G. A. Gray Co., members of the executive committee. J. M. Manley, manager of the Cincinnati branch, made a brief report of the association's activities. Homer D. Sayre, national commissioner, was a guest at the meeting.

At a foremen's gathering immediately following the business session, 18 men were presented with certificates showing that they had completed the prescribed course in conference leadership training. The presentation was made by E. L. Heusch, supervisor of trades and industries of the Ohio State Department of Education at Columbus.

Structure of "Crystallized" Locomotive Forgings

In a talk delivered before the Montreal mid-winter meeting of the American Society for Steel Treating, F. H. Williams, Canadian National Railways, showed a series of microsections taken from axles, side rods and other locomotive forgings which had failed in service. He said that failures could sometimes be attributed to sharp fillets or other erroneous machine work or to the unauthorized use of welding.

However, most of the fractures, by far, were associated with a coarse-grained microstructure, coarse ferrite mesh, or ferrite bandings along stringers of inclusions. A broken surface which showed partly detailed or creeping fracture, and the rest a granular break, was spoken of by shop men as a "crystallized piece with a flaw." This company is now securing forgings which must meet the requirements of small-sized grain when polished, etched and viewed at 50 diameters.

The annual meeting of the American Refractories Institute will be held at White Sulphur Springs, W. Va., May 8 and 9, instead of May 16 and 17, as originally announced.

Steel Practice Determines Quality

Howe Memorial Lecturer Emphasizes View That Those Elements Making Inferior Steel Are Not Reported in Conventional Chemical Analysis

IN presenting an account of how a given element or impurity may affect the properties of steel in various ways depending upon its origin, Henry D. Hibbard, the Howe Memorial Lecturer for 1928, made a strong plea that the furnace practice be considered as a vital factor when investigating the effects of alloying elements and gases in simple steels.

Limitations of Chemical Analysis

Speaking on the topic, "Significance of the Simple Steel Analysis," he pointed out that the usual chemistry does not tell the whole story because it is incomplete, because it tells nothing of how the elements enter the constitution of the metal, because it tells nothing of the scavenging elements which have been lost, and because it gives no information about the portion of the ingot from which the sample is obtained, nor of the casting temperature. In the lecturer's opinion these are a few of the vital considerations affecting quality; a good steel is different from a better steel, largely by reason of differences in furnace working and subsequent treatment; a bad steel is bad most often because of chemical or physical elements wholly undetermined in the conventional analysis. He emphasized the view that "iron is iron" no matter what its origin; but in view of the infinite variety of circumstances which may occur between the ore pile and the finished bar, no two pieces of steel are exactly alike, nor is it possible to make perfect steel.

Carbon, of course, is the most powerful alloy in iron; the mutual interactions increasing strength either by simple alloying or after heat treatment are unique in metallurgy. Taking the tensile strength of commercial iron as 45,000 lb. per sq. in., the effect of alloying 0.9 per cent carbon is to add 105,000 lb., making the ultimate strength 150,000 lb. per sq. in. Heat treatment will add another 150,000 lb., and cold drawing 200,000 lb. more, making the strongest carbon steel, heat treated and cold worked, capable of carrying the extraordinary load of 500,000 lb. per sq. in. before rupture.

Other elements have a definite influence on the amount and distribution of solid non-metallic impurities and the properties of steel. As shown in the accompanying table, each of them is worthy of close attention, and no two of them are identical. (The discussion is limited to simple steels whose maximum analysis is as follows: Carbon 1.5 per cent, manganese 1.0 per cent, silicon 0.6 per cent, sulphur 0.15 per cent, phosphorus, 0.12.

All Insolubles Are Harmful to Steel

When classified in another way, it is found that all ingredients which are insoluble in the solid metal iron (either gases or solid non-metallic inclusions) are a detriment to quality. Of the soluble elements, the above mentioned are useful; that minute part of the oxygen and nitrogen which remains in true solution in the iron is harmful; sulphur and phosphorus in solution are usually harmful; arsenic in solution is neutral; and the effect of hydrogen in solution is not known.

Manganese Important at End

Proceeding from these general summations, the lecturer passed to a more particular examination of the effect of each of the soluble elements, and how these effects depend upon the presence of others, the time of addition, and the furnace practice. The important effects of manganese occur before and during casting of the ingot. In molten steel it eliminates and intercepts iron oxides, and after the reaction goes as oxide to the slag, if the slag is of the proper nature. In the acid process, emulsified silicon oxide is present in the bath to flux the manganese oxide; in basic steel the silicon must be added with the manganese. Residual manganese (that is, remaining from the raw materials charged) is essential for the best steel. "Killed steel" may have almost any amount of manganese, but it cannot be too high when a good boil is necessary. Manganese has pronounced effects on the working of the steel after it reaches the ingot. A high manganese safely allows a higher heat before forging or rolling. On the other hand, big carbon steel forgings must have lower manganese

for commercial heat treatments, especially as carbon is increased.

Silicon Is Medicine for Steel

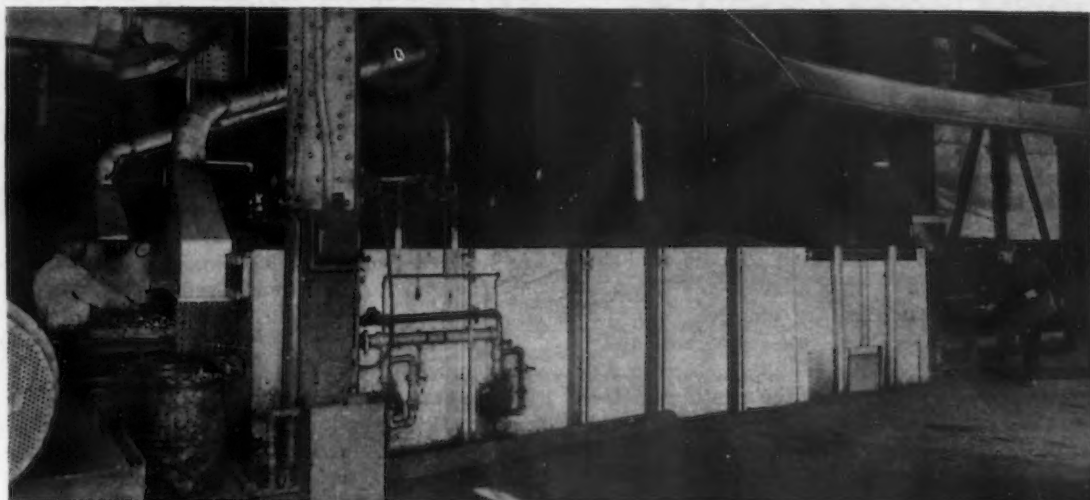
Silicon is added to molten steel as a curative. It is residual in acid steels. As an element in solid solution in iron, its action is beneficial. As an oxide entrapped in the metal it is highly damaging, even if as low as 0.01 per cent in a low carbon steel; consequently much of the finishing stage is planned to remove its last traces. Residual silicon has considerable effect on the acid steel making process; for instance, when melting for high carbon steel so much pig is used that the bath contains 0.3 to 0.4 silicon and it lies dead in the furnace. In other melts, silicon must be added to the metal not only to deoxidize it, but also to "kill" it (which is not the same). For the latter, 0.2 to 0.6 per cent is necessary; sometimes it is added in the ladle, because the action is rapid.

In the basic process all silicon is eliminated during the early stages of the melt before the carbon drops, consequently any silicon in the metal as tapped must have been added near the end of the heat. Its functions when so added are several. It checks further elimination of carbon, when the bath has reached the proper analysis. Since this action is almost instantaneous, this is a great manufacturing convenience. Or it may be added to deoxidize unfinished steel. An addition of 0.15 per cent is necessary for this action, which only takes a few seconds. Another curative action, when added to the furnace, is to form an acid oxide to flux out the basic oxides of manganese and iron which may be in solution in the metal. This is a slower process—at best it requires several minutes for any considerable washing of the metal and hours would be required to clean out the resulting silicates completely. Lastly, silicon is added in the ladle to prevent the formation of gas holes in the solidified ingot.

Interactions between carbon, silicon and oxygen are complex and vary with the temperature. As noted by the lecturer, at 700 deg. C. silicon begins to rob carbon monoxide of its oxygen with the formation of silica and free carbon. At 1550 deg. C. silicon prevents the liberation of carbon monoxide from molten steel, thus killing the metal. At 1600 deg. C. carbon will reduce silicon from the slag and the acid hearth. At 1650 deg. it will prevent the oxidation of silicon in the Bessemer converter, and at 1900 deg. C. it reduces silicon from its oxides and from silicates in the blast furnace.

Influence of the Elements

	Oxides	Silicates	Sulphides	Gases	Segregation	Mechanical Properties
Carbon	Neutral	Neutral	Neutral	Neutral	Neutral	Positive
Manganese	Positive	Positive	Positive	Neutral	Neutral	Moderate
Silicon	Positive	Positive	Neutral	Positive	Positive	Moderate
Aluminum	Positive	Neutral	Neutral	Positive	Positive	Neutral
Titanium	Positive	Positive	Neutral	Positive	Positive	Neutral
Vanadium	Positive	Positive	Neutral	Positive	Positive	Moderate



Some of the Smaller Gray Iron Castings, Made Both in Permanent and Sand Molds, Are Heat Treated to Soften the Metal, Increasing Its Machineability

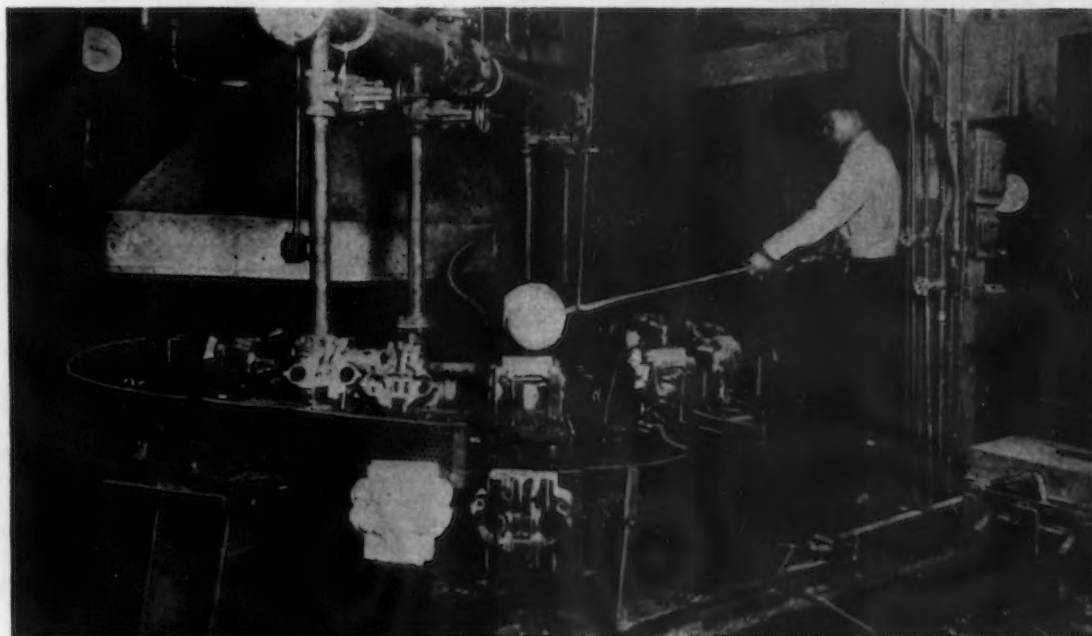
Gray Iron Castings Heat Treated

GRAY iron castings used by the Ford Motor Co., Fordson, Mich., for several of the smaller parts of its motor cars are heat treated in continuous furnaces before machining to eliminate hard spots, produce a fine grain structure, make the metal softer and easier to machine and consequently to speed up production in machine work on the castings. Some of the light castings, particularly carburetor castings, require small drill holes. After this annealing operation, drilling is done more rapidly and there is less breakage of drills.

Smaller Parts, Some Sand Cast and Others Made in Permanent Molds, Passed Through Continuous Furnaces at Ford Plant

The permanent mold process is used in making some of the small castings that are heat treated and others are made in sand molds. Castings made in permanent molds that are heat treated before machining include generator heads, timing gear housings and certain valves for automobiles, tractor pistons, timing gear blanks for tractors and various miscellaneous parts for plant equipment, such as conveyor wheels.

The permanent mold castings are poured on circular revolving platforms in iron molds. When shaken



Various Small Castings That Are Heat Treated Are Made in Permanent Iron Molds Which Are Poured on a Circular Revolving Platform

from the molds and still red hot they are dumped on plate-type carriers 10 in. wide and 34 in. long and are moved through a furnace with a rocker arm-type of pusher. The furnace is 25 ft. long. The castings are usually kept in the furnace 80 min. The heating temperature is found to be more satisfactory at 1650 deg. Fahr., although castings have been heat treated at 1500 deg. by keeping them in the furnace a longer time and they are sometimes given a longer soaking time at around 1650 deg. to produce a softer metal. At times the furnace temperature is increased to 1700 to 1750 deg. to shorten the operation and increase the furnace output. In case cold castings are charged into the furnace the heating operation takes approximately 2 hr.

The usual Brinell hardness of the castings after heat treating is 187, but there is a hardness range of from 177 to 207 depending on the type of castings. Some that require particularly soft metal for machining have a hardness of 177, while pistons have a higher Brinell hardness.

Three duplicate furnaces are used for heat treating the permanent-mold castings. These have a capacity

of 30 tons in an 8-hr. day, handling the output of eight permanent-mold molding machines. The furnaces are gas-fired with four burners on each side and are equipped with automatic heat regulators and recording charts.

From the discharge end of the furnace the castings are dumped into an adjoining elevator and taken to a cleaning room on the second floor. When they have reached that floor, they have cooled sufficiently to go into tumbling mills for removal of fins and scale. They are tumbled from 20 to 30 min., which, it is stated, is only one-fourth of the time required for tumbling similar castings made in sand molds.

Sand castings that are heat treated before machining include bushings and several of the small parts for carburetors. These castings, on leaving the furnace, go to tumbling mills and then to the machine shop. Two furnaces are provided for heat treating these castings, these being practically identical with those used for heat treating permanent-mold castings. The sand castings are left in the furnace from 2 to 3 hr. After heat treatment, they have a range in Brinell hardness of 143 to 207.

URGES BETTER COST-KEEPING

Effect of Incorrect Prorating of Overhead Pointed Out to Connecticut Manufacturers

UNDESIRABLE consequences following the use of two formerly accepted methods of prorating overhead expense were pointed out by J. M. Carney, industrial engineer, Hartford, Conn., in an address on "Ignorance of Costs Is a Menace to Industry," at a recent joint meeting of the Connecticut Manufacturers Association and the Hartford chapter of the National Association of Cost Accountants.

"Only about 25 years ago there were two generally accepted methods of prorating overhead expenses in cost accounting," said Mr. Carney. "The first of these was to add the cost of known or productive labor and material together, and then add 33 1/3 per cent or 50 per cent to cover all else or overhead. The other was to add to the known or producing labor 100 or 125 per cent, then add the material and call the total a cost upon which selling prices were based.

"Many concerns operating on these systems were successful and were greatly expanded. They succeeded in spite of the system rather than because of it, but those were the days when you could add 50 to 100 per cent for profit to the supposed cost and if you showed a net of 20 per cent real profit at the end of the year, all was well."

Mr. Carney pointed out that every manufacturing concern is really several concerns in one, that overhead expense is created by a definite operation or process and is a part of the cost of that process controlled by the time taken to produce, and that material, generally speaking, does not control overhead.

"By way of illustration, it was stated that in the manufacture of pins a mechanic and helper might operate a battery of 10 to 15 machines which might be used in manufacturing both steel and brass pins. Assuming that the known labor is 1c. per lb. and that steel wire costs 2c. per lb. and brass wire 17c. per lb., the labor and material or prime cost of steel pins would be 3c. per lb. and of the brass pins 18c. per lb. By the old method of adding 33 1/3 per cent to prime cost, the overhead added would equal 1c. per lb. on the steel pins and 6c. per lb. on the brass pins, whereas the actual overhead in pin making consisted of depreciation of machinery, repairs and replacements, power, heat, light, supervision, supplies, etc.

"As a matter of fact these elements of overhead are less when producing brass pins than when producing

steel pins but by the 33 1/3 per cent method, six times as much is added to brass pins as to steel pins," he said.

He told of a metal novelty concern which, in addition to its standard cataloged lines, also did a large amount of jobbing in metal stamping and screw machine parts. Its old method of applying overhead was to add 125 per cent to the productive labor of all departments. A year came when the profits dropped to a large extent on an unusually large volume of sales. Analysis proved that while the profits on the standard lines exceeded \$80,000, the net for the year was less than \$20,000 due to losses in the jobbing departments. Naturally the stamping and screw machine departments cannot be operated on a 125 per cent basis.

"Everyone knows," said Mr. Carney, "that a man operating a battery of expensive automatic machines creates an overhead in depreciation, repairs, power, etc., that does not apply to a bench hand; yet when the same percentage is added to all labor, false costs are bound to result."

Former Methods Still Followed

Fearing that the illustration presented might be accepted as of old methods, not followed now, Mr. Carney told of visits to 44 manufacturers, only 12 of which had cost systems worthy of the name; and the lack of proper cost data prevailed in large as well as small concerns.

As an illustration of the need of better cost-keeping methods in Connecticut, as well as in many other industrial centers, Mr. Carney cited the following case: A Connecticut manufacturer required a large quantity of a brass part made on Brown & Sharpe screw machines. Bids per 100 pieces were received from six Connecticut parts makers as follows: A, \$2.20; B, \$2.47; C, \$2.84; D, \$3.60; E, \$3.78; and F, \$4.32.

The actual cost of material on the above was \$1.94 per 100. B filled the order at \$2.47 per 100, as A had made a clerical error using net material weight, making no allowance for scrap. A visit to all of the above resulted in the knowledge that only two had cost systems and the correct cost was \$3.60 per 100, including all overhead.

A comparatively simple stamping wanted in large quantities was sent to 19 concerns in and out of the State. The quotations varied from \$3.50 to \$9.66 per 100. Bids on gray iron castings varied from 3.8c. to 7.6c. per lb.; malleable iron castings from 5.9c. to 12.8c. per lb.; and brass castings from 17.4c. to 32c. per lb. Quotations on an advertising booklet ranged from \$5,270 to \$12,230.

Continuous Enameling of Gas Stove Parts

A CONTINUOUS furnace for fusing porcelain enamel on gas stove parts is a feature of the St. Louis plant of the Quickmeal Stove Co., a subsidiary of the American Stove Co. The new unit is a combination of a furnace and a traveling conveyor. Both the ground and finish coats are burned on the steel and the drying operation is included, thereby doing away with the necessity for a separate drying oven.

Parts to be enameled are suspended from the conveyor, which is of the continuous chain type and is in the form of a closed loop. At both ends of the conveyor the chain engages large horizontal sprockets, one being driven by a motor and the other being an idler. Between the sprockets the chain is suspended from a steel framework. The conveyor is 119 ft. long.

On the driving end the conveyor extends 39½ ft. beyond the furnace; at the idler end it projects 19½ ft. beyond. The furnace itself, which is built of brick, is 60 ft. in length. Dipping tanks and spraying booths are arranged along the exposed portions of the conveyor, so that work, as soon as it is covered, is hung on hooks suspended from the chain. The work enters the furnace through small openings provided for that purpose. The furnace is divided into five zones along its longitudinal axis. The heating zone in the middle occupies 10 ft., while the preheating and drying zones are located at the ends and take up the remainder of the space, or 50 ft.

The drying and preheating zones are in a common chamber. The hot ware emerging from the heating chamber runs parallel with, but counterwise to, the cold work which has just entered the furnace. There is, therefore, a rapid transfer of heat from the hot work to the cold ware, reducing the fuel consumption necessary to bring work up to temperature in the heating zone.

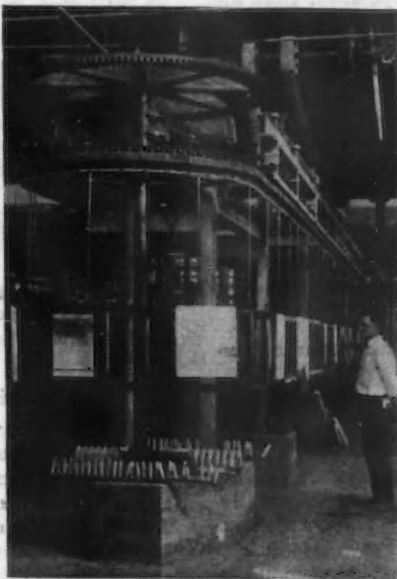
A semi-muffle divides the heating zone into two longitudinal chambers, which are kept at separate temperatures for different classes of work. Each chamber is equipped with automatic pyrometer control. Ordinarily the tem-

perature in one is set at the proper degree for the ground coat and in the other for burning on the finish coat. Heat is supplied by 16 gas burners located in the heating zone, half on either side. These are manifolded and supplied with inspirators which automatically proportion the gas-air mixture for efficient combustion and proper furnace atmosphere. With the use of the inspirators, which are of the venturi-tube type, an oxidizing, neutral or reducing atmosphere can be maintained in the furnace automatically.

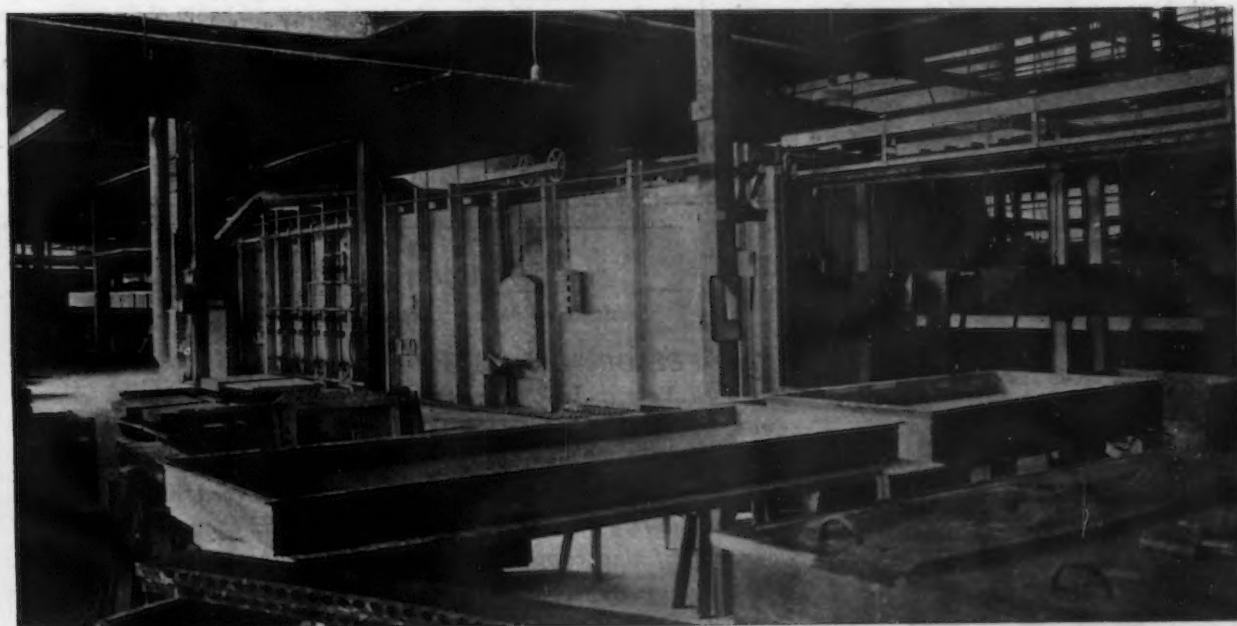
The ware is heated gradually as it travels the 35 ft. from the time it enters the furnace until it leaves the heating chamber. This takes 7 min., as the conveyor, driven through speed reduction gears, travels at a rate of only 5 ft. per minute. If time is allowed for the steel base to heat up close to the same temperature as the enamel, the latter will mature regardless of the gage of the ware.

One side of the conveyor is continuously loaded with ground coat, while the other side burns white or finish coats. The work with the fused ground coat is removed from the conveyor as it leaves the furnace, is dipped for the white coat and is then sent back through the other side of the furnace. One heating chamber is therefore kept at a temperature about 100 deg. Fahr. higher than the other, the ground coat requiring the more intense heat.

The furnace was installed by the Surface Combustion Co., Toledo, Ohio.



Driving End of the Chain Conveyor, Showing Large Horizontal Sprocket Operated by Motor



Continuous Enameling Furnace Equipped with Continuous Conveyor. Work is dipped in the tanks (shown in the foreground) for the ground coat and is hung on the conveyor and carried into the furnace where the enamel is burned on. Issuing from the other end of the furnace, the work is given a finish coat and is returned to the furnace for the final fusing operation

Metallic Flow During Rolling

Institute of Metals Lecturer Believes Formation of
Twins Is as Essential to Flow in Many Metals
During Working as Is Crystalline Slip

SLIP between fragments of the original crystals has been held to be the principal action during the plastic flow of metal upon rolling or forging. Much microscopic and experimental work has been published to support this conception, and the most lucid explanation of the hardening phenomena yet proposed is founded upon various factors which interfere with this process of slip, and therefore resist the plastic flow and harden the metal.

In the Institute of Metals Lecture, delivered in New York on Washington's Birthday, Prof. C. H. Mathewson of Yale University argued the proposition that the formation of twins in the original crystals is often the earliest effect of overstrain, and that subsequent severe deformation is a combination of the two processes, viz., development of crystalline twins, and of slip along crystal planes. Much of the argument is of a highly specialized nature, and to follow it requires a working knowledge of theoretical crystallography; however, the theory was developed primarily by reference to the action of large crystals of zinc, upon which the results of twinning are fairly clear, and which have been studied closely and described at length by the lecturer and his associates at Sheffield Scientific School.

Twinning Is an Action Requiring Small Atomic Displacements

Twinned crystals are most commonly illustrated by the microstructure of brass, wherein large crystals of solid solution are crossed by parallel bands of material which etches uniformly at a different tone from the adjacent metal. Studies of the crystal lattices usually show that relatively small movements of the constituent atoms in space are all that is necessary to produce a new crystalline system, which, for instance, may be merely the mirror reflection of the original—a "left-hand crystal," so to speak. Dr. Mathewson illustrated the action on a slab of zinc, split from a single crystal, and consisting essentially of a series of right prisms with hexagonal cross-sections, as shown at the left of Fig. 1. If this block is completely rearranged by twinning along one set of diagonal planes (known to crystallographers as the $1, 0, -1, 2$ planes) the block will be found to have its thickness reduced 6.75 per cent, with corresponding increases in breadth and length, but

the elementary hexagonal prisms are now on their side, as shown at the right of the figure. That such an action requires comparatively small atomic movements is indicated in Fig. 2, where the paths of the two rows of atoms to the right of the $(1, 0, -1, 2)$ diagonal plane are indicated.

In his laboratory, Professor Mathewson has studied single zinc crystals after various degrees of reduction by rolling. The above indicated action actually occurs on slight compression. After a 7 per cent reduction of thickness by rolling, it is possible to identify the type of twinning of much of the metal. This is done by measuring the angles between the traces of twinning planes at their intersections with the surfaces of the block, by examination of the surface with polarized light (when all material of a given twinning system will flash out simultaneously) and by X-ray analysis. He finds that not only does the original metal form twins on a wholesale scale, but these twins again twin, thus forming "twins of the second and third generation." As the process continues it becomes impossible to distinguish the production of twin lamellæ from slip bands, because the intersections of a full complement of twins through only three generations would permit no angle greater than 5 deg. to separate adjacent traces of principal crystalline planes on the original cleavage surface.

Recrystallization Starts at Twin Boundaries

The lecturer then considered the meager evidence about similar actions in other metals. He favors the view that Neumann bands in iron are twins formed during work, and cited similarities between recrystallization phenomena in cold-worked iron and in zinc. A similar intimate connection between twinning and recrystallization is observed in pure beta brass. Diagrams like Fig. 2 show that the atomic spacing at the ends of twinning planes and at their intersections are different than in the body of the crystal; this is an indication that a state of high internal strain exists at such places, and they are probably the germinating centers for recrystallization. Fig. 3 also shows that an internal twin band, even if tapered in cross-section, will introduce strains varying from zero to very large amounts along the boundaries. Thus, intersecting sets of narrow bands of variable etching characteristics,



C. H. Mathewson

Institute of Metals Lecturer for 1914

PROFESSOR MATHEWSON received degrees from both Yale and Göttingen Universities, and has been engaged continually in research and educational activities. He has been a member of the faculty of Yale since 1907 and professor of metallurgy since 1919. He is recognized as an authority on theoretical metallurgy, and the metallography of zinc, copper and brass. His address is Hammond Laboratory, Sheffield Scientific School, Yale University, New Haven, Conn.

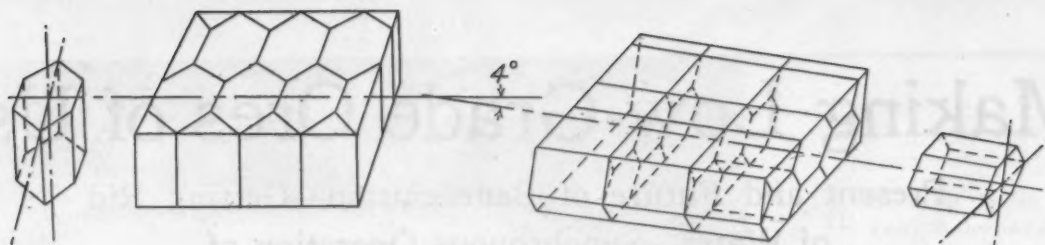


Fig. 1—By Complete Twinning a Slab Split from a Zinc Crystal Changes Its Entire Organization with Slight Change in Outer Shape

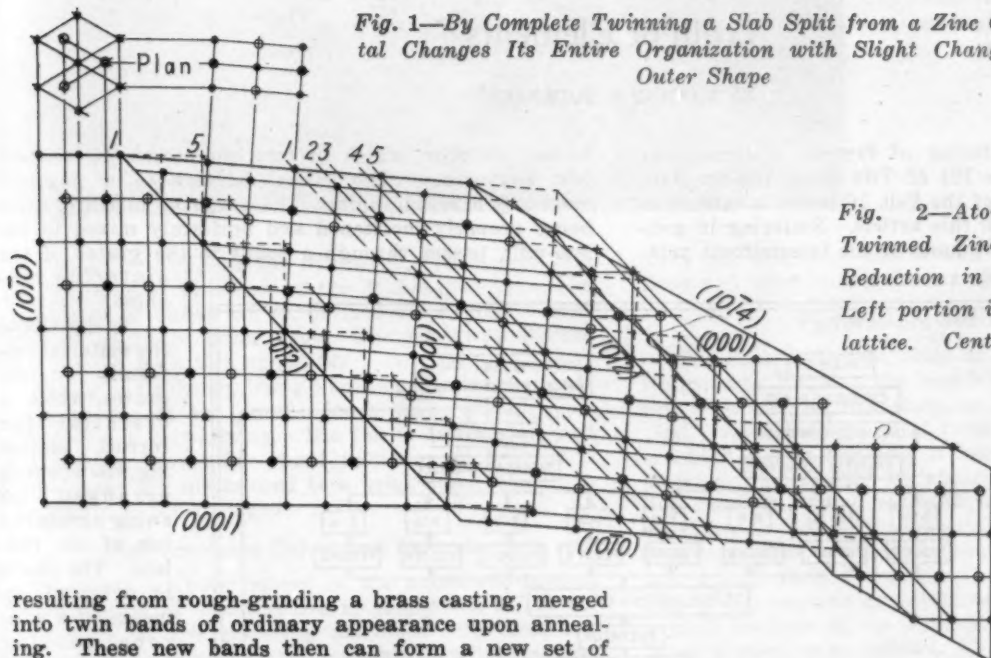


Fig. 2—Atomic Locations in Twinned Zinc, with Progressive Reduction in Thickness of Piece. Left portion is original crystalline lattice. Central portion is twin along $(1,0,-1,2)$ plane. Right portion is conjectured return to original orientation

resulting from rough-grinding a brass casting, merged into twin bands of ordinary appearance upon annealing. These new bands then can form a new set of twins with slightly different orientation on further work. In such considerations Professor Mathewson explains the fact that a cast material rolled to gage and finished with one anneal would be less uniform and more directional in its properties than the same material annealed several times during the process, although both might look very similar under the microscope.

Combination of Twinning and Slip During Working of Metals

It is admitted that simple twinning unaccompanied by slip does not provide for any considerable change in the dimensions of the crystal. Twinning plus slip is necessary to account for the great plasticity observed during rolling. At present there is a difference of opinion as to what happens during severe cold work. One school holds that the movable surfaces of slip are forced into line with the direction of stress by rotation, or by fragmentation without any great change in orientation. The other opinion is that severe lattice distortion is produced by a combination of slip and bend-

ing. Mathewson and Phillips have pointed out that the observed conditions could be satisfied by twinning across slip planes. The mechanism in its early stages is illustrated in Fig. 4, where the specimen is a single crystal of zinc bounded top and bottom by basal surfaces. When the end is pinched between the rolls it may be twinned from top to bottom, as shown in 4a. Irregularities in the process will prevent the ideal development of twinning and slip shown at 4b; complicated invasion and interpenetration of twin bands will more likely occur as in 4c. Fig. 4d shows a reduction less than the amount produced by complete primary twinning; here the rolled material ideally consists of alternate lamellae of the original crystal and its twin.

(Concluded on page 710)

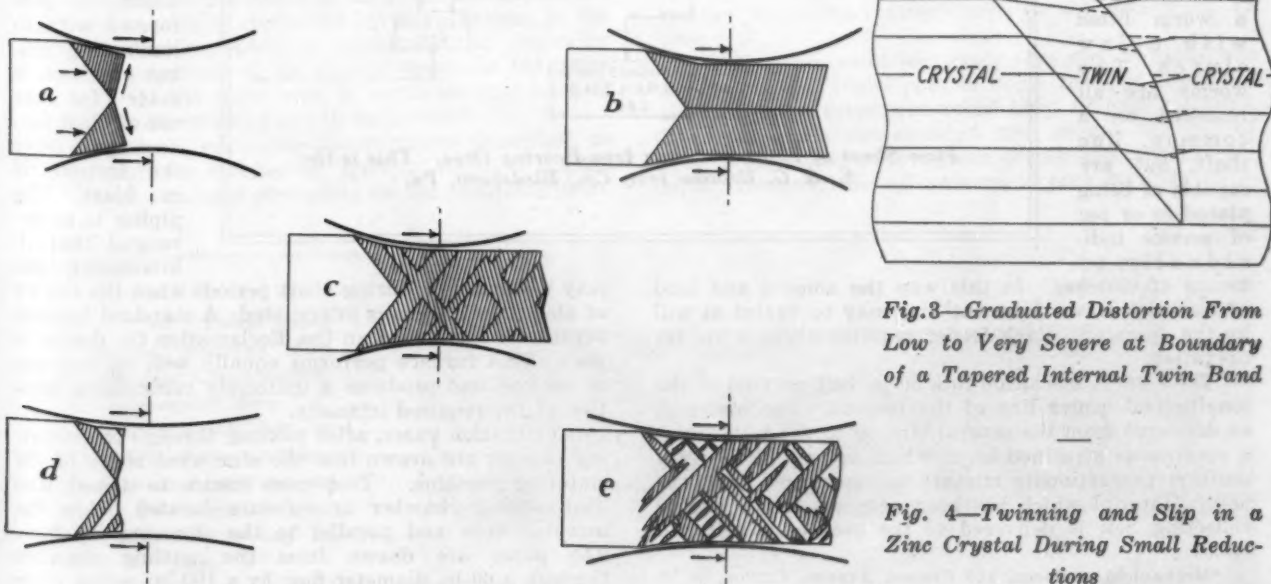


Fig. 3—Graduated Distortion From Low to Very Severe at Boundary of a Tapered Internal Twin Band

Fig. 4—Twinning and Slip in a Zinc Crystal During Small Reductions

Making Low-Grade Ores of Use

Present and Future of Beneficiation—Getting Rid of Water—Synchronous Operation of Train of Elements

BY EDWARD J. TOURNIER*

CONTINUOUS sintering of ferrous materials, as described at page 191 of THE IRON AGE for Jan. 19 and page 466 of the Feb. 16 issue, is carried to its logical conclusion in this article. Sintering in general, whether on the continuous or the intermittent principle, may be looked to as the medium for rendering available enormous tonnages of low-grade or wet materials now virtually unusable.

```

graph TD
    A[CRUDE ORE] --> B[CRUSHING PLANT]
    B --> C[INCLINED CONVEYOR]
    C --> D[SHUTTLE CONVEYOR]
    D --> E[ ]
    style E width:0px,height:0px
    
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Crushed ore, which is minus $\frac{3}{8}$ -in. product, is delivered by an inclined belt conveyor to a shuttle belt located over a series of eight sintering plant bins. A standard-gage track is provided over two of the end bins for receiving flue dust, sintering fuel, sinter fines and other material.

Each of the eight bins is fitted at the bottom with a revolving table feeder. (See Fig. 1, page 192, Jan. 19 issue.) Each table is equipped with a worm gear, driven by a worm fitted with a jaw clutch. The worms are all mounted on a common line shaft, but are capable of being placed in or out of service individually, by means of clutches. In this way the amount and kind of material drawn from the bins may be varied at will by the operator. Each feeder requires about 3 hp. for operation.

The feeders discharge to a 30-in. belt parallel to the longitudinal center line of the feeders. The material, as delivered from the several bins on to the belt, forms a continuous stratified layer which is maintained in a uniform proportionate mixture as discharged from the belt. Material which has been properly mixed on the collecting belt is delivered to the boot of a belt and

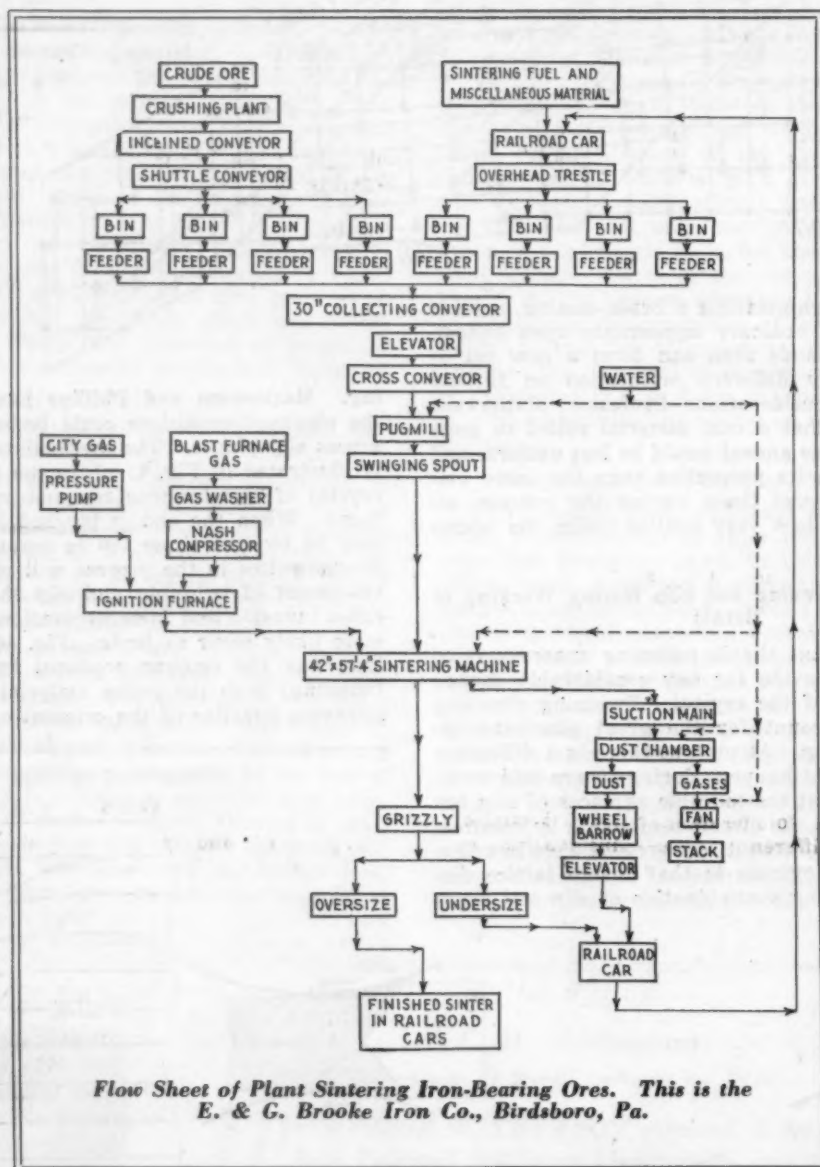
bucket elevator, which in turn discharges to a short belt conveyor. The latter delivers to a pug-mill driven by a 20-hp. motor. The sintering mixture, after being properly moistened and uniformly mixed in the pug-mill, passes through a spout to the grates of the sintering machine.

To distribute the material uniformly on the grates, which is essential for correct sintering, the spout is arranged to swing across the top of the pallets. The chute is actuated by means of a wire rope passing oversheaves and receiving its power from a crank on the end of the sintering machine drive shaft. In this manner the motion of the swinging spout is a function of the machine speed. Any change in the latter is transferred to the spout and a corresponding alteration in the feed to the grates is effected.

Primary ignition is performed with illuminating gas, but provision is made for the use of blast furnace gas when the furnace is in blast. The piping is so arranged that illuminating gas

may be turned on during short periods when the supply of blast furnace gas is interrupted. A standard ignition furnace of the American Ore Reclamation Co. design is used. This furnace performs equally well on any gas or oil fuel and produces a uniformly controllable ignition of the required intensity.

Combustion gases, after passing through the sintering charge, are drawn into the nine wind boxes of the sintering machine. They pass thence to a cast iron dust-settling chamber or collector located below the machine floor and parallel to the sintering machine. The gases are drawn from the settling chamber through a 60-in. diameter flue, by a 100-in. center-plate



**Flow Sheet of Plant Sintering Iron-Bearing Ores. This is the
E. & G. Brooke Iron Co., Birdsboro, Pa.**

*Mechanical engineer, 110 Clinton Avenue, Clifton, N. J.



***END** of a Pallet, with Fully Sintered Charge. Note the homogeneous nature of the sinter and the absence of fines*

fan especially designed for this work. (See page 469, Feb. 16 issue.) This fan, of the double-inlet type, has a capacity of 60,000 cu. ft. of free air a minute at a pressure of 20-in. water gage. The American Blower Co., Detroit, built this apparatus.

Owing to the heavy loads placed on the fan, its shaft bearings are of the double-sleeve water-cooled type, spherical and self-aligning. The fan is direct-connected to a 350-hp. adjustable-speed induction motor. Exhaust gases are discharged to a brick stack 7½ ft. in diameter and 160 ft. high.

Synchronizing Drives and Controls

An essential requirement is the automatic control of the volume of material fed, in proportion to the requirements of the sintering machine. No less important is the control of the proportions of the sintering mixture. The controls must be synchronized and be capable of adjustment either individually or simultaneously.

The vital instruments for the accomplishment of these functions are generally Reeves variable-speed controllers, connected in series by a drive belt. The first controller, which for the purpose of description is termed A, is connected by a belt to a 30-hp. constant-speed motor. The variable-speed shaft of controller A drives the sintering machine countershaft and also drives the constant-speed shaft of second controller B. A drive is taken from B through its variable-speed shaft, to the sintering mixture feeders and the collecting belt system with its feeders.

It will be evident, from this disposition of the apparatus, that any change in the sintering machine by adjustment of controller A produces a corresponding change of speed of the feeders. In addition, if it is desired to change the volume of material delivered by the feeders to meet differences in sintering machine requirements, this is accomplished independently of the machine speed by adjustment of controller B. After such adjustment, the speed of the feeders will continue to be automatically controlled by any changes in the sintering machine speed, by adjustment on controller A. The proportion of the various materials fed, from any or all of the eight bins, is regulated manually by means of independent gates in each feeder.

The controls governing the functions described, as well as those for moistening, ignition, depth of charge, etc., are all arranged accessibly on the operating floor.

Thus one attendant has instant direction of all operations and observations from a single point.

Performance and Capacity

The E. & G. Brooke plant at Birdsboro, Pa., has for its primary function the beneficiation of French Creek ore, which, in its raw state, as before stated, is practically valueless as a blast furnace material. At present high-carbon flue dust is being used as a source of sintering fuel, thereby reclaiming the iron values of the flue dust simultaneously with desulphurizing and beneficiating the ore. This material, owing to its comparative coarseness, requires no hearth layer, and, as it requires only about 3½ per cent of its weight of sintering fuel, it imposes no severe service on the grates. A typical analysis of the French Creek ore and the sintered product is as follows:

French Creek Ore	Raw, Per Cent	Sintered, Per Cent
Fe	52.70	54.80
SiO ₂	11.50	12.90
Al ₂ O ₃	2.10	2.50
CaO	1.70	2.30
S	2.60	0.10
P	0.04	0.05
Mn	0.15	0.21

The plant and auxiliary equipment are laid out for two sintering machines, 42 in. x 57 ft. 4 in. Only one of these, however, has been installed. It has a capacity of 500 tons of sinter in 24 hr., and is operated by a 30-hp. motor. At the middle speed of the Reeves controller, the rate of pallet travel is 68 in. a min.

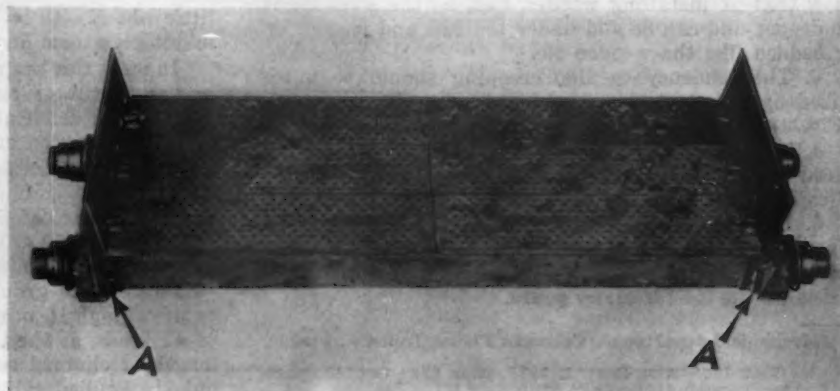
As the sintering plant necessitates 24 hr. a day operation, two labor shifts are employed, nine men being in the day shift and eight men at night. The capacity is equivalent to 29.4 tons of sinter for each man-day.

Future Trend of Sintering

High-grade and cheaply minable iron ores are rapidly diminishing. The decreasing average iron content of the ores being shipped each year indicates that the future ore supply from the Lake Superior district will require increasing expenditures in the production of ores.

Great tonnages of low-grade ores are available, but all require additional cost in some form of beneficiation to render them economical blast furnace material. The high-grade concentrated ores permit the use of limited quantities of low-grade ore by admixture therewith. However, the advantages of ores carrying mini-

***TOP** of Pallet and Grates, Showing Also the Air Seal Construction. The rectangular bars "A" rest on a track bar at either side of the sintering machine and prevent air leaks. The same air seals are noticeable at top of page*



mum slag-producing constituents is self-evident as related to economy of smelting, and high-grade concentrates will develop preference.

Millions of tons of iron ore in the Lake Superior regions are unmerchantable, due to their moisture contents. Elimination of water content would render this class of ores as good as, or better than, a large percentage of ore as shipped. A class of ore known generically as "paint rock" occurs in working mines, the shipping ore from which bears the burden of expense of its initial development. Mining paint rock could therefore be done without development cost.

The beneficiation of this class of ore, as well as other ores of highly hygroscopic nature, will require only sintering to render them not only equal to the average shipping ore, but of greatly superior physical state and perfectly dry, thus eliminating heavy wasted expense of freight on water content.

Flue-dust production varies with the class of ores used in the furnace. Based on an average of 5 per cent of ore burden, a 500-ton furnace would produce about

50 tons of dust, which in turn would make about 42 tons of sinter. This, however, would constitute only about 4½ per cent of the ore burden, thus necessitating drawing on the stock pile. Ultimately the stock pile will be used up, and the sintering plant will either have to go on part time, or other materials will have to be found, to utilize it.

Since most of the large flue-dust stock piles in the United States have disappeared, and the limited use of pyrites cinder renders this material a practically negligible quantity in the problem of selecting sintering materials, the natural direction of sintering is toward beneficiation of low-grade ores and of concentrates.

Our iron and steel industry has reached the point where rigid economy in pig iron production, and the preservation of the ore supply, are essential to its perpetuation. The use of sinter made from ores and concentrates otherwise useless in the blast furnace, however, points the way to the fullest utilization of potential sources of supplies for an indefinite time.

Steel Ties for American Railroads

A Form Shown Which Has Distinct Advantages—
Answers to Many Objections

BY JOHN H. JONES*

ONE type of steel tie which I have seen manufactured always appealed to me as being the most suitable for use in this country. The design, roughly, is as shown in the diagram. The peculiarity of its form embodies some useful features, which may, in some degree, answer the points raised in previous articles,† which were as follows:

1. First and ultimate cost.
2. Problems of installation as compared with wooden ties.
3. Tendency to side creeping.
4. Difficulty of maintaining gage.
5. Failure due to corrosion.
6. Rolling or shifting position under sudden braking of fast rolling trains.
7. Tendency of the bolts to loosen under wave strain.
8. Satisfactory method of insulation for signal systems.

1. The cost of manufacturing these ties should be reasonable, as the section of the plate as rolled is of an easy rolling design, as shown in Fig. 1. The plant necessary for forming the tie and rail clips or holes, as desired, should be capable of making about 2000 tons of ties a week. Two 8-hr. shifts a day, a total of 11 shifts a week, would be used, with about 20 unskilled workmen per shift, or a total of 40 men. From this an approximate cost of manufacture can be derived which should not exceed, in my opinion, say \$8 a ton after the rolling, which would include the cost of the necessary power for working the plant. Undoubtedly a reduction could be made on this by working three 8-hr. shifts a day.

The two forms of rail fastenings, (1) key and distant piece, and (2) bolt and clip, I am informed, can be manufactured at low cost. I have seen as many as 12 of these ties made in 1 min.

2. The difficulty of installation should be no greater than that of installing wooden ties, as the steel tie is no deeper and can be slid under the rail and packed up or bedded like the wooden tie.

3. The tendency to side creeping should be minimized by the down-bend at each end of the steel tie (Fig. 3) which dig themselves into the ground.

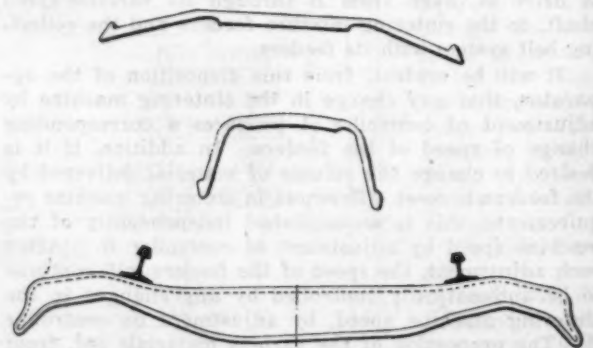
4. The difficulty of maintaining gage is not experienced where these ties are in general use, as both forms of rail fastenings have been in use for many years.

5. Failure due to corrosion is taken care of by dipping the tie, while still hot, into a bath of tar or creosote. The skin of protecting material thus formed remains on the tie for many years.

6. The hollow form of these ties and the manner in which they bed into the ground give them a great resistance to any shifting due to the action of moving trains.

7. The tendency for the bolts to loosen should be no greater than the tendency for the splice-bar bolts to loosen. However, should the bolts have a tendency to do so (which I doubt, seeing that strong split-spring washers are usually placed under the nuts), then the key and distant piece type of fastening could be used. This, I think, is the most favored fastening for steel ties.

8. A method of insulation for signal systems I know



Suggested Form of Steel Tie. Fig. 1 (top) is the section as rolled and before forming. Fig. 2 (center) is the formed section at mid-length. Fig. 3 (bottom) is a side view of the completed tie

little about. It is possible that the hard tar coating might give some insulation effect, but this I cannot say.

In steel ties the rail seats must have the correct and necessary tilt or angle, and the fastenings should be designed so as to allow the necessary adjustments for gage widening on curves.

The favorable features referred to in Fig. 3 are (1) the ends bent down to resist side movement; (2) the middle part of the tie is well dished, giving it depth for strength; (3) the parts which come under the rail flange are left rather flat, to insure a wide bearing surface on the ground. Small steel ties could be used to advantage in mines, plantations and light railroads of all kinds, as the tie could be made of a light straight length of channel section. There are many useful and quickly applied rail fastenings for this type of tie.

*Mechanical department, Colorado Fuel & Iron Co., Pueblo, Colo.

†See THE IRON AGE, Sept. 1, 1927, page 559; Oct. 13, page 1041; Dec. 1, page 1536; Dec. 22, page 1721.

Steel Building With Corrugated Sheets Welded On

CORRUGATED copper-bearing steel sheets were used for siding and roof of the new plant of the Alliance Tank Co., Cleveland. The roof is of 22-gage sheets and the siding of the same material but of 24-gage. Electric welding was utilized in fastening the corrugated steel sheet to the structural members. All the interior fittings, such as brackets, bracing, line-shafts, hangers, etc., were electric welded.

The company specializes in gasoline, oil storage and pressure tanks, vats, oil pits for filling stations, paint kettles and varnish tanks, distributed under the trade name of "Thoro-weld" tanks. The work is done by means of the Lincoln Electric Co. welding process.

Improves Portable Arc Welder

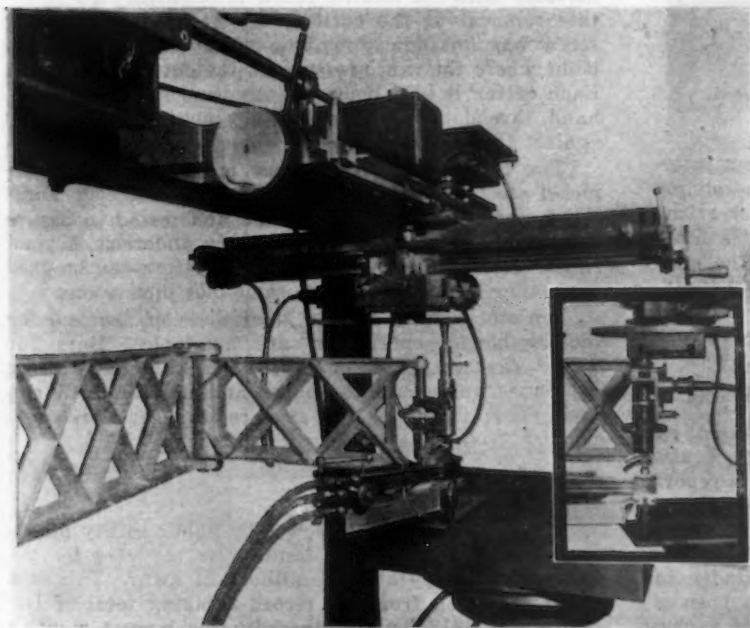
ELMINATION of live connections from the front of the control board is a major new feature of the type S welding machines of the Wilson Welder & Metals Co., Inc., Hoboken, N. J. The main switch is inclosed and mounted on the back of the board and only a dial and pointer appear on the front. The reactor is under-slung and is so placed that it is protected from injury.

A rotary switch is incorporated to give close regulation for both repair and production welding operations. It is stated that short or long arc; high open circuit voltage for long arc; and low open circuit voltage for short arc, are available as required. The close control provided is claimed to adapt the machine for overhead welding. Several sizes of the machine, equipped with motor generator set, gasoline engine or for belt drive, are available.

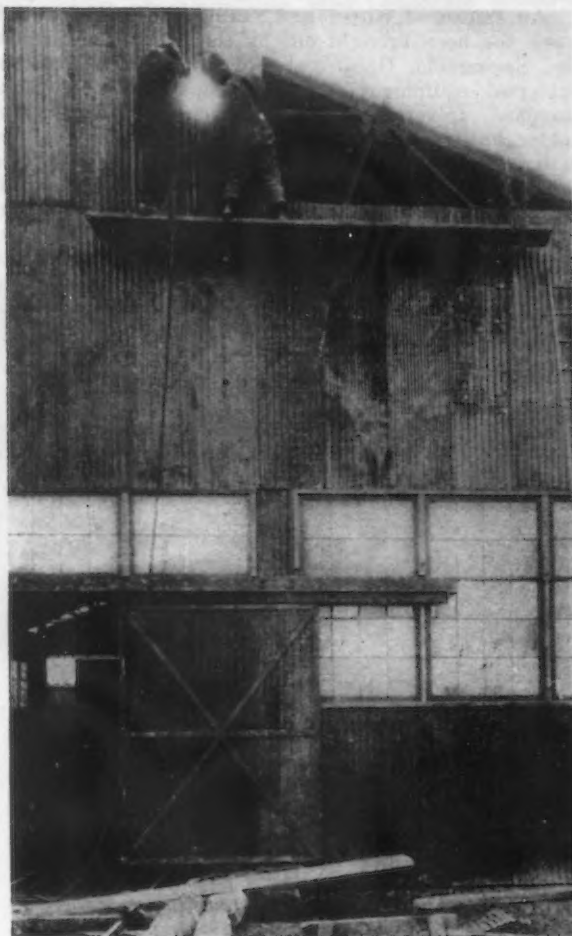
Oxy-Acetylene Cutting Machine Has Many Automatic Features

AN automatic machine for oxy-acetylene cutting containing many refinements is now being imported by the Hubar-Jones Corporation, 13 Astor Place, New York. Known as the "Godfrey Oxygen Jet Cutting Machine," it is said to have been in successful use in English and Continental railroad and shipbuilding shops for some years.

The traversing screw and cross-slide shown prominently in the view is set at any angle to the main frame, and is hung from a carriage driven as desired by a screw along the top girder of the guillotine frame. All movements are power driven at closely controlled speeds by means of flexible shafts, and are equipped with automatic stops and indexes so any shape bounded



Godfrey Cutting Machine Set for Cutting Circles. Inset: Special drive for irregular outlines



Corrugated Steel Sheets Fastened by Welding to Structural Members

by straight lines can be cut and duplicated with certainty.

The weight of the cutting blowpipe and its attachments is carried by a pantograph arm hinged to the rear pillar of the main frame, not shown in the view. A short mast in line with the blowpipe axis connects with the driving mechanism above. In the illustration it is connected with a radius bar and a rotating mechanism attached to the cross-slide. By means of a flexible shaft, any circle up to 3 ft. in diameter can be cut.

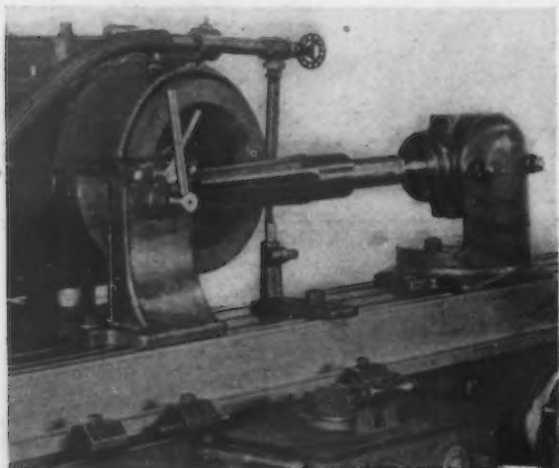
Larger circles up to 15 ft. can be cut by holding the torch stationary in proper position, and rotating the table carrying the plate. Ingenious automatic trips and stops enable the machine to cut more intricate shapes bounded by straight lines and circles, without special templates.

Templates are necessary for irregular curves such as gear teeth. These are affixed upside down to a plate which replaces the radius bar. The blowpipe is driven around the desired contour at a uniform speed by a wheel and pin engaging snugly in the template slot, as shown in the inset.

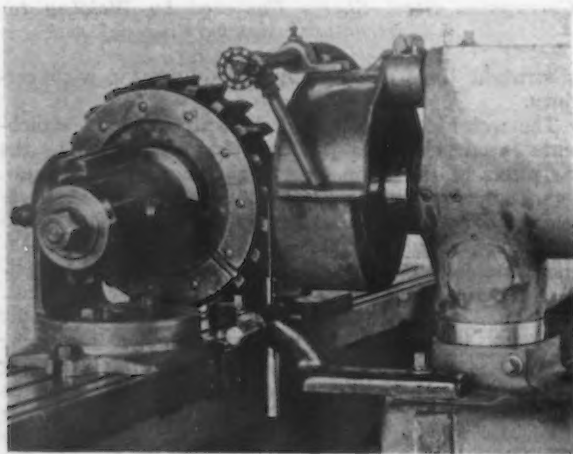
The blowpipe may be set at various angles for a beveled edge. It has graduated wheels on the gas valves for accurate resetting and a master lever which cuts off all gases simultaneously. Mixing of the preheating gases is done in spiral passages in the blowpipe head, and the preheating flame issues from an annular orifice entirely surrounding the cutting jet. An unusually thin kerf or slot is cut, and the cut surfaces are quite smooth, due to the uniform rate at which the cutting flame is driven and the stability of the machine generally.

Cutter and Reamer Holder for the Thompson Universal Grinder

An improved cutter and reamer holder with tailstock has been brought out by the Thompson Grinder Co., Springfield, Ohio, and will be included with the universal equipment for the company's 12 x 36-in. standard universal grinding machine. The cutter holder has capacity for milling cutters up to 12 in. in diameter, straight or spiral teeth. It can be swiveled through a vertical plane as well as through a horizontal plane, and is used with a cup wheel so that straight angle clearance may be obtained on the cutter teeth. The tailstock, used when reamers are to be ground on centers, has capacity for reamers from $\frac{1}{2}$ in. to 12 in. in diameter, 36 in. long. It is designed



The Cutter and Reamer Holder and Tailstock Used in Sharpening a Reamer Is Shown Above. The grinding of a milling cutter is shown below



to permit free passage of the cup wheel without interference on the smallest reamers. It has a sliding quick-action movement to the center and quick-acting clamp for locking-in position. The headstock is fitted with the new standard taper hole adopted by the milling machine group of the National Machine Tool Builders' Association, and can be bushed down to any size taper or straight hole with collets that fit the various sizes of reamer or arbor shanks.

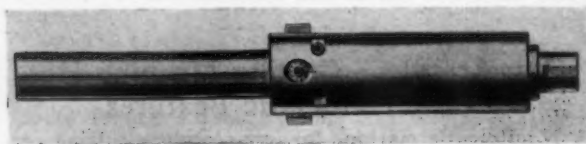
Approximately \$75,000,000 has been invested by private interests in commercial river steamers, boats, barges and terminals on the Ohio River, states a report prepared by engineers attached to the office of the United States division engineer, Col. Charles W. Kutz, at Cincinnati. Of this amount, approximately \$40,000,000 is invested in river craft and the remainder in terminals. The report shows that there has been a remarkable growth in river craft in the past 10 years, particularly in the number of steel barges and Diesel-type tow boats.

Expansion Boring Bars of Simplified Design

Simplicity of design and ease of adjustment are features of expansion boring bars recently placed on the market by the Larkin Packer Co., St. Louis. These bars are offered as production tools designed to maintain accuracy of bore and to compensate for wear on cutters by means of micrometer adjustment. There are only four main parts—an adjusting screw, with 0.001-in. graduations; a wedge threaded on the adjusting screw which serves to expand cutters; a thrust collar for piloting the adjusting screw; and a removable bushing for retaining expansion units in the body.

The method of expanding the cutters is said to provide accuracy and rigid construction. Wedge action, with bearing above and below center on angles of cutters, forces the cutters uniformly outward as the micrometer screw is turned. The hardened wedge, which is prevented from rotating by keyways, is threaded on the adjusting screw and travels forward or backward as the screw is turned. This adjusting screw rotates but does not travel. Thrust at the bottom is taken by a hardened and ground thrust collar, which serves as a centering unit for the conical point of adjusting screw, and also to support the adjusting screw on dead center. The wedge is arranged to support the thrust of the cutters and eliminate side play under strain.

The entire expansion unit is accurately fitted in place from the front of the bar and retained with a removable bushing, which provides access to the adjusting parts for purpose of replacement without damaging the bar. It is stated that by the arrangement adopted, the torsional strength of the bar body has been



Piloted Turret Lathe Boring Bar. The pilot is hardened and ground and has oil grooves. Micrometer cutter expansion is provided

materially increased, as only a portion of the body is drilled and reamed to accommodate adjusting parts instead of drilling entirely through the bar and plugging.

A feature emphasized is the method of locking the cutters in place. A hardened and ground eccentric locking screw, with threads at both ends serving as pilots, employs a positive cam movement for clamping each cutter in its slip-fitted slot. The cutters are immovable until the locking screw is released. To facilitate removal of the cutters, the head of the locking screw has an indicator mark set at zero, located on point where the cam pressure on the cutter is released. Each cutter is held independently, and right- and left-hand threads throw the locking movement inwardly against the wedge.

The body of the boring bar is of forged chrome-nickel steel and is heat treated. Cutters are of high-speed steel, and are heat treated and tested to assure uniformity of hardness. When worn undersize, beyond range of expansion in one bar, the cutters can be used in smaller diameter bars of same slot dimensions.

Ten stock styles and 16 stock sizes of the tool for various boring operations, are available. Bars for boring car wheels, locomotive driving boxes, driving rods, rod brasses, rocker boxes and brasses, etc., can also be furnished, as well as bars for special requirements.

Production of electric power by public utility plants in the United States in January is reported by the Geological Survey at 7197 millions of kw-hr. This is a slight reduction from the record-breaking total of December, at 7218, but is otherwise the largest month's output ever recorded. It compares with 6874 in November and with smaller totals in all preceding months.

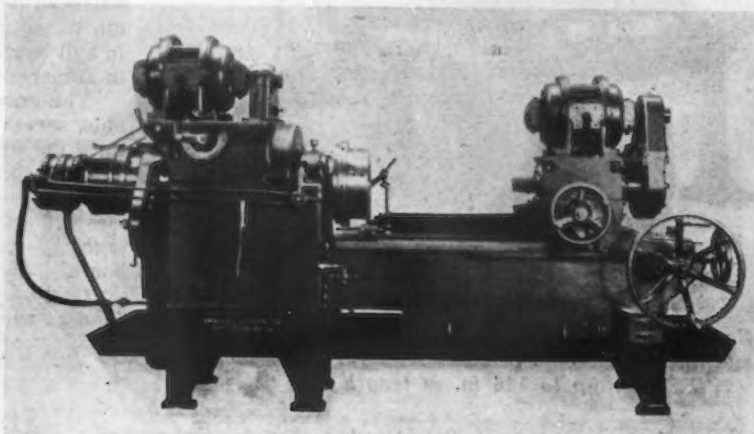
Thread Miller With Roller Bearing Milling Head and Other Improvements

Increased rigidity and flexibility in changing from one job to another were basic considerations in developing the thread miller here illustrated, which has been placed on the market by the Smalley-General Co., Bay City, Mich. This machine, designated as the No. 20, is offered as an improvement over the company's No. 23, previously marketed, and it is stated that, although designed for production purposes, the machine can be used to advantage on small runs of work.

Outside or inside, right or left-hand threads can be milled, and when equipped with a taper attachment the machine will mill straight or tapered threads up to 4-in. taper per foot. The range of external threading is $\frac{1}{8}$ to 8 in. in diameter and of internal threading, $\frac{1}{2}$ to 12 in. in diameter. Pitches range from 30 per in. up. It is claimed that form milling can also be done to advantage in many cases.

An outstanding improvement is the use of a roller bearing milling head, the spindle, and the pinion shaft which drives it, being mounted in Timken tapered roller bearings. The milling spindle is equipped with a No. 13 B&S taper and is driven by helical gears which run in oil. The milling head is arranged so that a turning tool can be attached conveniently and surfaces adjacent to the thread can be turned true with it. Rigid construction of the milling head is said to eliminate chatter and thus to add to the life of the hob. The main spindle has a 6 $\frac{1}{2}$ -in. hole and is flanged at the front end to facilitate quick changing of chucks. Several types of chuck may be used, depending upon the work to be done and the quantity of pieces to be milled. The chuck shown is a 5-in. three-jaw unit operated by an air cylinder, and with this equipment long work, 5 in. in diameter, can be put through the spindle. The main spindle is mounted in bearings cast integral with the bed. Two series of speeds are provided for the main spindle, one for turning and one for milling.

Either motor or belt drive may be employed. The motor-driven machine has eight speeds on the main spindle and six on the milling spindle, when four-speed motors are used. The belt-driven machine has a three-step cone on the main spindle, and a pulley on the pinion shaft of the milling head. Separate countershafts are provided for each spindle. Although the machine is primarily of the chucking type, it can be furnished with a tailstock and live center to permit work on centers. When a long overhung arbor is required an overarm can be used to support its outer end. A relieving attachment, for use in relieving taps and dies, can be furnished so that taps can be milled and relieved at the same time after fluting.



Mounting of the Spindle and Pinion Shaft in Tapered Roller Bearings Is an Improved Feature

The feed mechanism, which is patented, is designed so that the wear is distributed over the entire length of the thread of the lead screw, instead of coming at one place. It is said to be unnecessary to wait for a split nut to pick up the thread. The feed lever can be thrown in at any time and by means of this device a thread can be started at any point on the circumference of the work. A reversible coolant pump is provided for supplying cutting fluid to the hob, and piping is arranged so that the fluid may be directed either from the inside or the outside of the work.

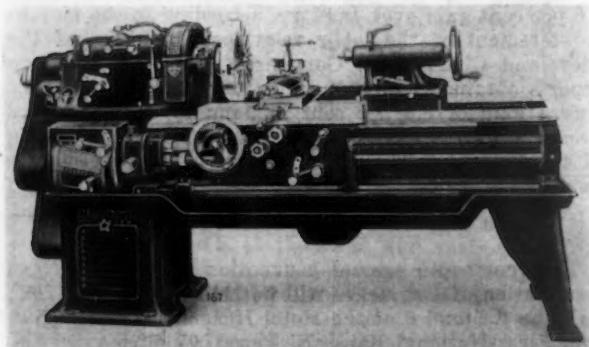
Geared-Head Lathes With Driving Motor in the Cabinet Leg

Geared-head lathes with the driving motor in the cabinet leg, under the head, have been brought out by the Cincinnati Lathe & Tool Co., Oakley, Cincinnati. Three sizes of the machine, 16, 18 and 20 in., can be furnished. A variety of types and sizes of a.c. or d.c. motor can be accommodated in the cabinet leg and the drive from the motor may be either by silent chain or belt.

The company's patented quick-change gear box, providing a wide range of threads and feeds, is incorpo-

rated in the new machine. Twelve spindle speeds are obtainable by shifting one or more of the three levers at the front of the lathe. All gears and shafts in the head are of chrome-manganese steel, heat treated and ground. A locking plunger is provided to facilitate removal of chucks and faceplates without strain on the shafts or the gear teeth. The clutch employed, of compression disk type, is said to transmit the full horsepower rating of the motor.

An index plate is prominently located on the front of the head to indicate the lever positions for each spindle speed. The lathes are supplied with or without oil pans, and with various lengths of bed.



A Plate in the Cabinet Leg May Be Adjusted to Accommodate Motors of Various Sizes and Types

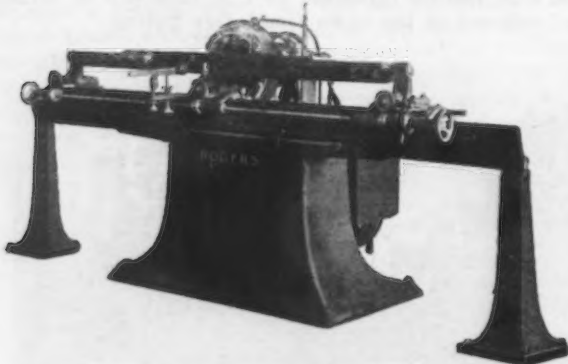
Lincoln Company Remodels Welding School

Lincoln Electric Co., Cleveland, has recently moved its welding school into larger and more convenient quarters. It now contains 10 curtained booths, each with welding table and all necessary accessories, and an individual arc welding machine. Students are accepted for an intensive course lasting one month; tuition is free. The school is under the general direction of A. F. Davis, vice-president; class work and individual coaching is given by special instructors. It is the aim to give men in this time a sound working knowledge of the fundamentals of arc welding, and fit them to engage competently in the trade.

Automatic Sectional-Wheel Knife Grinders

Sectional wheel automatic knife grinders, designated as the type R, have been added to the line of Samuel C. Rogers & Co., 191 Dutton Avenue, Buffalo. Eight different sizes, to accommodate shear and other blades from 76 in. to 146 in., in length, are available.

The machine is equipped with a 14-in. sectional grinding wheel mounted in a chuck having simple adjustment for holding and replacing segments. Rapid grinding with this type of grinding wheel is attributed to the spaces between the grinding sections, which form



Sectional Type Grinding Wheels Are Used. The machine is available in eight sizes for shear blades up to 146 in. in length

channels for carrying away the abrasive particles and the stock ground off the knife. The spaces also allow free entrance of the coolant to the point of grinding.

Equipment on all sizes includes an improved water attachment; spring cross feed; heavy yoke bottom supports to eliminate vibration and double ratchet feeding with automatic stops. The machines may be equipped with direct motor drive which includes a standard 5-hp. 60-cycle motor, starter, extended shaft, brackets, etc. They may also be equipped for belt drive with tight and loose pulleys. The smallest machine, the 76-in. grinder, requires floor space of 4 x 9 ft., net, and 4 x 14 ft. 2 in. when in operation. The shipping weight is 2450 lb. The largest machine, the 144-in. grinder, requires floor space of 4 x 26 ft. when in operation; the shipping weight is 3900 lb.

Light-Weight Electric Hand Saw for Maintenance Work

Light weight and balance are features of a new electric hand saw, designated as the Junior model J, which has been added to the line of Skilsaw, Inc., 3814 Ravenswood Avenue, Chicago. The machine weighs 11 lb. It



The Body of the Machine Is of Aluminum and Gears and Shafts Are of Chrome-Nickel Steel. The weight is 11 lb.

is designed for ripping and cross cutting dressed lumber up to 2 in., and is adapted for maintenance and repair work as well as for use in shipping rooms.

A ½-hp. special motor for direct current or alternating current, single-phase, 60-cycle or less, is employed. The speed of the motor is 1200 r.p.m., and the speed of the saw is 2500 r.p.m. The body of the machine is of aluminum and shafts and gears are of chrome-nickel steel. Ball bearings are used throughout.

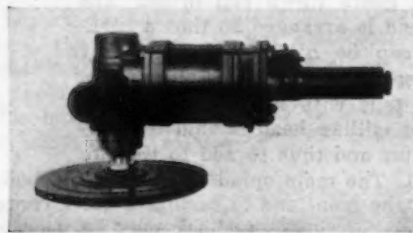
A kerf guide and safety guard are provided. The base is adjustable for various depths of cut. Standard equipment includes a combination 6-in. rip and cut-off saw blade; an adjustable rip fence attachment; 15 ft. of rubber-covered cord with connector; and a steel carrying case.

New Line of Rotary Air Grinders and Sanders

The Independent Pneumatic Tool Co., 600 West Jackson Boulevard, Chicago, has placed on the market a new line of Thor rotary air grinders and sanders, two models of which are here illustrated. Features include the motor, which is light in weight and carries four balanced bakelite blades, the latter being unaffected by oil, water or heat. It is mounted on a shaft suspended in ball bearings. The spindle is also suspended and held in alignment by large ball bearings.

The governor, which is fully inclosed and is adjustable, serves to keep the free-speed air consumption low, until the wheel is applied to the work, when it automatically throttles to the speed and air required for the job. An automatic oiler is provided and the unit carries sufficient light oil to lubricate all moving parts for eight hours. A baffle plate muffler is incorporated in the box-like lug on the spindle support.

One of the machines illustrated is the No. 271 R sander, which has a right-angle housing and carries



The Sander With Flexible Disk Is Above and the Air Grinder With Grip-Handle Throttle Is Shown Below



flexible disks 9 in. in diameter and smaller. The length overall is 14 in. and the speed is 4000 r.p.m. Another machine is the No. 271 grinder, which weighs only 15½ lb. and is 21¼ in. long overall. It has a straight handle throttle, and the speed is 4000 r.p.m. It carries a 6-in. emery wheel having a face of 1½ in. A No. 272 grinder, illustrated herewith, is also available. This unit weighs 17¼ lb., measures 19¾ in. overall and is equipped with a grip handle throttle. It carries an 8-in. emery wheel having a 1½-in. face. The speed is 3200 r.p.m.

Employment in Cleveland during February showed a 2.6 per cent gain over January, according to the monthly statement of the labor relations committee of the Cleveland Chamber of Commerce, which is based on reports obtained from 100 large manufacturers. There was a gain of 6.6 per cent in January and February over the first two months last year. There was a gain of 4.5 per cent in the steel industry in February and a gain of 5.3 per cent in the automotive industry.

The fourteenth annual convention of the American Association of Engineers will be held in El Paso, Tex., on June 4, 5 and 6 at the Hotel Hussman. L. M. Lawson, First National Bank, El Paso, is chairman of the local committee.

Five-Ton Lift Truck With Platform Height of Over 11 In.

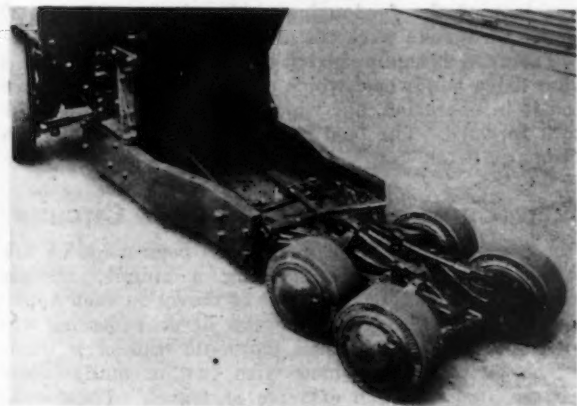
With capacity of 5 tons, a tier lift truck for handling material on skids, and having a platform height of only 11 in. when lowered (58 in. when elevated), has been brought out by the Elwell-Parker Electric Co., Cleveland. This company has been making a lift truck with the same minimum platform height, but it was of only 2 to 3-ton capacity.

Problems in the design of the truck were to provide a trail axle, wheels and their steering mechanism sufficiently low in height to permit a low platform, to steer all wheels simultaneously and on concentric circles, and at the same time have sufficient tire and bearing capacity to carry the load. The trail or front axle has four steerable wheels with tires 10 in. in diameter and 5 in. wide. The two driving wheels are 22 in. x 4½ in.

All six wheels are steered by a hand wheel through a miter and worm gearing. A feature of the truck is



Exceptionally Low Platform for a 5-Ton Lift Truck Features This Unit. Its steering capacity is unusual, inasmuch as all four of the small wheels under the platform are steerable in unison, as shown below



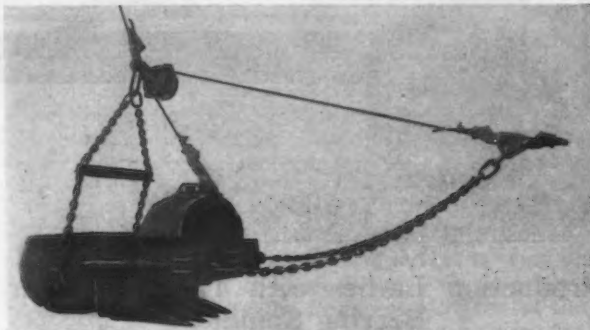
the general use of anti-friction bearings. The gear-reduction mechanism and motors have ball bearings, and there are ball bearings at the bottom of the steering column. The drive wheels have double radial and thrust ball bearings, and the trail wheels, tapered ball bearings.

Separate motors for the drive and lift are located within the frame housing. The platform is 26½ in. wide and 60 in. long. The truck will turn in intersecting 78-in. aisles. It has a speed of 300 to 400 ft. a minute and a lifting speed of 6 ft. to 9 ft. a minute.

Employment figures of the National Metal Trades Association show a decline in January from a year ago of nearly 3 per cent, based on returns from 35 centers covering the area north of the Ohio and east of the Mississippi River. The total this year was 581,717, against 598,653 a year ago. There has been a recent improvement, however, for the January total is larger than that of any of the four preceding months. December was the lowest recent figure, at 541,232.

New Type of Dragline Bucket for Heavy Duty

Dragline buckets in four sizes from ½ to 1¼ cu. yd. are now being made by the Harnischfeger Corporation, Milwaukee. These buckets are designed to withstand severe service. The bottom and sides are shaped from a single piece of heavy tank steel, and all seams are electrically welded. Welded construction provides a



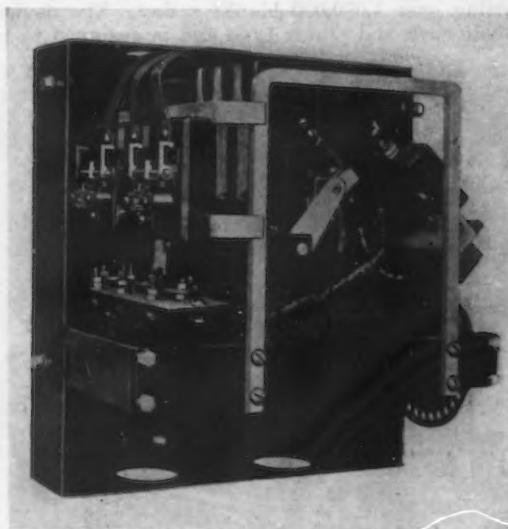
Designed for Rigidity in Heavy Service

smooth inside surface, and prevents sticky soil or weeds from clinging to the bucket. The bucket teeth, heavy steel forgings, are securely bolted through the cutting lip and bottom of the bucket.

It is a difficult problem to prevent the sides of a dragline bucket from drawing together at the front end. However, the large box-section hood and heavy Z-bar supports here used promise to eliminate much of the trouble. The drag chain clevis is provided with lugs which pull against shoulders in the hitch plate, thereby transmitting the pulling stresses directly from the bucket to the chain, instead of through the connecting pin. The pin merely acts as a guide and is not subject to bending strains. This type of hitch plate is said to make it easy to adjust the cutting angle of the bucket.

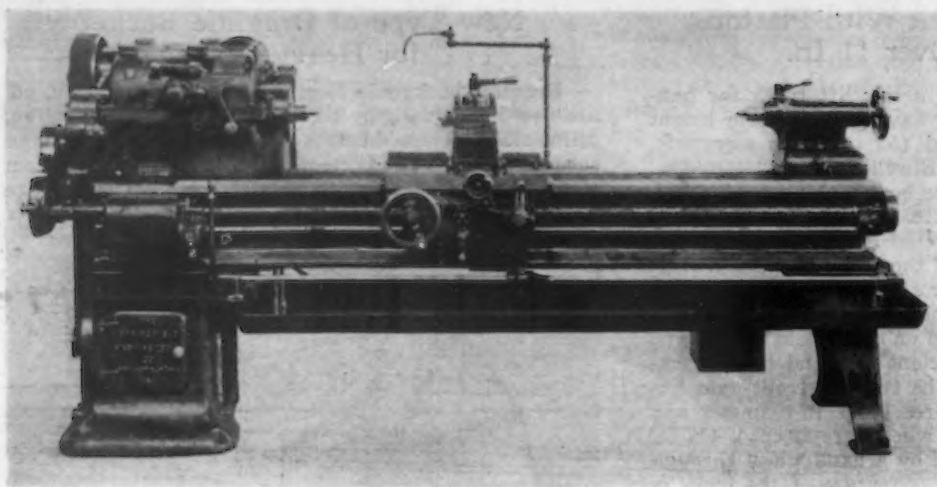
Adjustable Automatic Induction Starter

An automatic induction starter with two adjustable features is being made by the Lincoln Electric Co., Cleveland. One of the adjustments is in the starting



current and starting torque, and is made by changing the position of the rotor in the regulator. This rotor is index mounted and the starting torque and starting current of the motor are increased by going to the higher numbers of the scale and decreased by going to the lower.

The other adjustment is in the current at which the throw-over takes place. The throw-over in this new starter is controlled by retarding solenoid, which is operated by the motor current. The pull of this solenoid can be adjusted by a simple lock rod arrangement carried on its plunger.

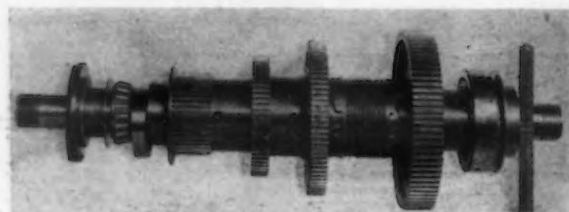


TAPERED
Roller Bearings, Arranged as Shown Below, May Be Provided for the Spindle. In place of the rapid change-gear device, the machine has an instantaneous feed box

Production Lathes with Tapered Roller Bearing Spindles

Ball-bearing geared-head production lathes equipped with Timken tapered roller bearings on the spindle have been brought out by the Springfield Machine Tool Co., Springfield, Ohio. This spindle mounting, shown in the separate illustration, is available for all sizes of lathes. Precision type roller bearings are employed and thrust is taken up on the front bearing, which has ample adjustment to keep the spindle free from slack at all times. This type of construction is recommended for production work because it tends to eliminate vibration and chatter and, in case of accident, the bearings can be replaced promptly from stock.

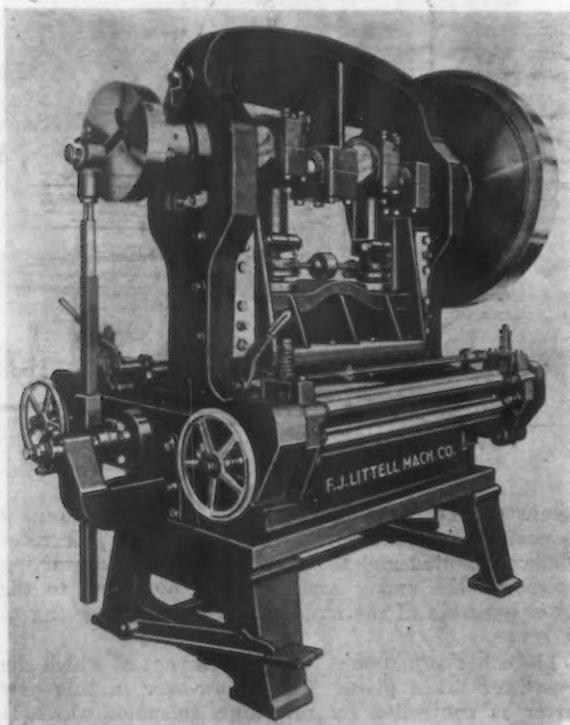
Although arranged for production work, the machine illustrated has the company's standard headstock with ball bearings and drop-forged, heat-treated gears which run in oil. In place of the rapid change-gear de-



vice, an instantaneous feed box, which gives six changes of feed for each setting of the change-gears, is used. There is an automatic stop on the feed rod. A power rapid traverse screw, operated entirely from the front, is used in place of the lead-screw. A taper attachment, oil pump and piping are mounted on the rear of the machine. The turret toolpost on the lathe illustrated can be interchanged with a compound or other type of tool-rest.

New Roll Feed for Use on Punch Presses

A punch press feed recently brought out by the F. J. Littell Machine Co., 4125 Ravenswood Avenue, Chicago, for use on double-crank presses, is said to be capable of cutting over 1,000,000 blanks a day. The device is of double rack and pinion type and is designed to take



Punch Press Feed of Double Rack and Pinion Type for Material Up to 1 In. in Thickness

any material, including rubber, up to 1 in. in thickness. In a test of the feed using rubber it is said that 37 blanks per stroke were cut at a speed of 80 r.p.m.

The feed is equipped with double rolls and with a roller drive handwheel which does not revolve when the feed is in operation, but which can be used to feed the stock forward. The feed has a hand lifter and also an automatic lifter.

New Limit Switch for Control Circuits

A new design of limit switch has been made by the General Electric Co., furnishing a simple, reliable means for controlling the limits of travel on such applications as motor-operated window or door-opening apparatus, valves, etc., where magnetic control is used.

The switch is provided with two normally-closed contacts, one for each extreme of travel. These contacts are operated by two cams, mounted on opposite faces of a molded gear. The two cams are adjustable with respect to each other and, as a further refinement, each contact has a micrometer screw which makes possible very close adjustment of the opening point for each contact, after the general position of the cams has been set. The molded gear, with the two cams, is driven by means of a worm gear. The entire mechanism is inclosed in a cast iron box with sheet-steel covers on front and back.

Milton Mfg. Co. Discharged from Receivership

The Milton Mfg. Co., Milton, Pa., manufacturer of bolts, nuts, rivets and iron and steel bars, has been discharged from the receivership under which it has been operating for some time. The receivers were W. W. Wilson and Charles Steele. Following their discharge, George S. Shimer, former president and a director of the company, resigned. Within the next week or 10 days the stockholders will meet and elect officers and a board of directors.

REPAIR CORRODED BRIDGES

Notable Structures in Pittsburgh and Rochester
Reinforced by Welding on New Metal
to Replace Losses

GEORGE J. GREEN, Pittsburgh Welding Corporation, Pittsburgh, who was the speaker at the monthly meeting of the Pittsburgh section, American Welding Society, at the William Penn Hotel, Pittsburgh, Wednesday evening, Feb. 29, not only outlined some interesting arc welding repair work on bridges, but described a new method that was worked out while some work was done on bridges of the Pittsburgh & Lake Erie Railroad.

One of the most interesting pieces of work along this line was rebuilding badly corroded members of a bridge over the Allegheny River, a 240-ft. through truss, pin-connected span, built 31 years ago.

Parts of the floor system, kept constantly moist by the proximity of timber, were greatly reduced in section. Columns were compression members built of Z-bars and web plate and, directly above and below the pin bearing plates, were perforated and reduced in section over 60 per cent.

Strips of steel, 1 in. by $\frac{1}{2}$ in., extending from the bottom of the column to a point well beyond the corroded portion, were welded on after the surface of the original metal had been thoroughly cleaned by use of the acetylene torch, scrapers and wire brushes. Bars were welded into position vertically, and tied together at close intervals with crossbars of the same section. After each joint was completed, the strength of the weld was tested by a number of blows with an 8-lb. maul. Laboratory results showed practically no deterioration of the physical properties of the original

metal when welded by the metallic arc process.

This bridge was further strengthened by having narrow cover plates welded to the top chord. The new plates fitted between the line of existing rivets and were secured to the chord by a continuous weld, thus eliminating the necessity of cutting out rivets or drilling holes in a structure already highly stressed.

Other work of similar nature mentioned by Mr. Green was done in Rochester, N. Y., on the steel arch known as Driving Park Avenue bridge. One of the main diagonals, a built-up section consisting of web plates, flange angles and lattice bars, was found badly corroded. The lost section was replaced by inserting a half-inch reinforcing plate about 40 ft. long between the flange angles and using the arc process to attach it to the original metal.

Slack diagonal eye bars and tie rods have been tightened for the Pittsburgh & Lake Erie Railroad. A device consisting of turnbuckles welded to wing plates, perfected by the Pittsburgh Welding Corporation, were assembled, taken to the bridge and welded to the bar to be tightened. The bar was then cut between the two wing plates and drawn taut by drawing up the turnbuckles.

Much welding was done on the new Mount Washington Roadway bridge, Pittsburgh. The concrete arches are reinforced with steel trusses, consisting of flanges and web members, the splices of which were completely welded. The steel skeleton was built upon false work and concrete poured in the forms built around this steel reinforcing, leaving keys open at all the splices to allow welding to be carried on. Portable welding outfits were installed upon the parts of the arch already poured and remained in one location while all the splices were welded. There were 16 keys in the 208-ft. main arch, each containing splices between angles, 6 x 4 x $\frac{5}{8}$ in., butted together, and reinforced by welding splice plates over these angles.

Wage Scales for Sheet Workers Unchanged; Steel Average 3c.

The bi-monthly examination of the sales records of independent sheet steel manufacturers held in Youngstown March 2, by Elias Jenkins, representing the Western Sheet Steel Manufacturers Association, and Michael F. Tighe, representing the Amalgamated Association of Iron, Steel and Tin Workers, disclosed 3c. per lb. as the average sales price of Nos. 26, 27 and 28 gage black sheets in the 60 days ended Feb. 29. This is the same average as in the previous 60 days and accordingly wage scales for the next two months remain unchanged at an advance of 25 $\frac{1}{2}$ per cent over base.

Payrolls in Metal-Working Plants Decline

Payrolls in 195 iron and steel plants were reduced from December to January by 1.3 per cent, whereas the number of men on the payroll was increased 0.4 per cent, according to figures of the United States Bureau of Labor Statistics. Using identical plants, the number of employees went from 245,260 in December to 246,137 in January, whereas the weekly payroll declined from \$7,309,256 to \$7,211,681.

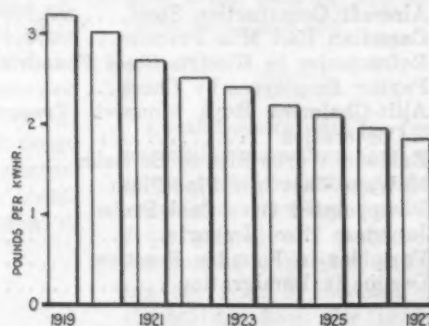
Foundry and machine shop plants to the number of 942 reported a slight decline in employees, from 218,126 to 217,610. The decline in amount of payroll was 2.9 per cent, from \$6,405,569 to \$6,221,243. Similar conditions in 148 machine tool plants showed a reduction of employees from 27,016 to 26,967, accompanied by a decline of 1.8 per cent in total payroll, from \$845,612 to \$830,477.

Prizes of \$1,000 and \$500 are being offered for the best essays on an economic subject, by Alvan T. Simonds, president Simonds Saw & Steel Co., Fitchburg, Mass. The contest is open to everyone and essays are to be from 3500 to 5000 words in length.

Continued Improvement in Utilization of Fuel

Coal consumption by public utility plants in the United States in 1927 is estimated by the Geological Survey at 1.83 lb. per kwhr. This estimate takes account of the coal equivalent of other fuels. The figure is the lowest ever recorded, and displaces the previous low record of 1.95 lb. in 1926. As recently as 1919 the figure was 3.2 lb. The 1927 unit consumption was only 57 per cent of that for 1919.

If the 1927 output of power had required the unit



Reduction in Fuel Cost of Developing Power, as Shown Graphically Above, Saved 34,000,000 Tons of Coal Last Year

consumption of 1919, the fuel requirements would have been almost 80 per cent greater than they were in 1927. In place of 45,709,000 net tons of coal (including coal equivalent of other fuels), the consumption would have been approximately 80,000,000 tons, or some 34,000,000 tons more than actually was consumed.

Progress from year to year has been steady. Not a year of the eight subsequent to 1919 but showed a drop in unit consumption from all of the preceding years. This reduction is indicated graphically in the diagram.

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This Issue in Brief

Sharp competition and not lack of business is responsible for "profitless prosperity," says National Industrial Conference Board president. During six-year period, 1920-1925, \$32 was lost by unsuccessful companies for every \$100 earned by profitable concerns.—Page 660.

Westinghouse plant produces 96 different kinds of alloy scrap. Machines are supplied with tote pans for accumulating scrap, which is then tagged, collected, weighed, appraised and placed in suitable storage bins.—Page 657.

Elimination of water content would make millions of tons of now unmerchantable iron ore in Lake Superior region worth mining. Beneficiation of these and many other types of ores would require only sintering to make them equal in value to average shipping ores.—Page 670.

Usual chemical analysis is often unsatisfactory in determining effects of alloying elements and gases in steels. Howe Memorial Lecturer says that such chemistry tells nothing of how elements enter constitution of metal or of scavenging elements which have been lost, and gives no information about portion of ingot from which sample is obtained or of casting temperature.—Page 662.

Conservation of fuel plays important part in creating unemployment in mining industry. Displacement of low-efficiency engines by large units of public utility plants has brought about annual saving of about 34,000,000 tons of fuel.—Page 680.

Encourages research to develop metals and methods for air craft construction. Materials and practices later used in many other ways are often developed in this way and are utilized to an extent in excess of anything that might be immediately expected of aeronautics.—Page 709.

Wages have probably reached point of equilibrium, says economist. Further rise would tend to increase unemployment, and only factor which might disturb present wage situation would be an upward trend in commodity prices.—Page 660.

Heat treat gray iron castings at Ford plant. Annealing before machining helps to eliminate hard spots, produces a fine grain structure and makes metal softer and easier to machine. Drilling may also be done more rapidly after annealing operation and there is less breakage of drills.—Page 663.

Manganese has important effects on working of steel after it reaches ingot. A high manganese safely allows a greater heat before forging or rolling, while large carbon steel forgings must have lower manganese for commercial heat treatment, especially as carbon is increased.—Page 662.

Formation of twins in original crystals is often earliest effect of overstrain in plastic flow of metal in rolling or forging operations, says Yale professor. Subsequent severe deformation is combination of development of crystalline twins and of slip along crystal planes.—Page 666.

Gray iron or steel castings may now be X-rayed through a thickness of 3½ in. Blow-holes, cracks, bubbles, foreign materials and other flaws are easily detected in one or two exposures.—Page 656.

Steel furniture orders in January, totaling \$3,250,000, were largest on record. Orders for steel shelving also set new high, amounting to \$768,000.—Page 714.

State and local taxes absorbed about one-fifth of Ohio corporations' profits during period from 1922 to 1924. Expansion of functions of State and local governments, waste and extravagance and lack of centralized control are cited as chief cost of increasing tax burdens.—Page 661.

February pig iron output was lowest for that month since 1922. However, actual production figures show daily rate of 100,004 tons, an increase of nearly 8 per cent over January, with a net gain of two active furnaces.—Page 684.

Continuous furnace for fusing porcelain enamel on gas stove parts combines features of furnace and traveling conveyor. Both ground and finish coats are burned on to steel and drying operation is included, thus eliminating need for separate drying oven.—Page 665.

Automatic control of volume of material fed, in proportion to requirements of machine is essential in sintering operations. Control of proportions of sintering mixture is also important.—Page 669.

ESTABLISHED 1855

THE IRON AGE

A. I. FINDLEY, *Editor*

W. W. MACON, *Managing Editor*

Member of the Audit Bureau of Circulations and of
Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York
C. S. BAUR, *General Advertising Manager*

F. J. Frank, *President*

George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 239 West 39th Street, New York. A. C. Pearson, *Chairman*. F. J. Frank, *Pres.* C. A. Musselman, *Vice-Pres.* Fred O. Stevens, *Treas.* H. J. Redfield, *Secy.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: 425 Park Square Building. Philadelphia: 1402 Widener Building. Cleveland: 1362 Hanna

Building. Detroit: 7338 Woodward Ave. Cincinnati: 408 Union Central Building. Buffalo: 835 Ellicott Square. Washington: 536 Investment Building. San Francisco: 320 Market St.

Subscription Price: United States and Possessions, Mexico, Cuba, \$6.00; Canada, \$8.50; Foreign, \$12.00 per year. Single Copy 25 cents.

Entered as second-class matter, June 18, 1879, at the Post Office at New York, N. Y., under the Act of March 3, 1879.

PRINTED IN U. S. A.

Fuel Efficiency Displaces Miners

CONSERVATION of fuel by its more efficient use creates no small share of the country's coal mining problem. It was estimated some years ago that we had 200,000 more miners than were required to mine the coal we then were consuming. More recently an expert estimate placed the excess at 300,000 miners.

Returns of fuel consumption by public utility plants give a total of about 39,000,000 net tons of coal and coal equivalent in other fuels for 1919. For 1927 the estimate is a little under 46,000,000 tons. Between these years, however, the output of electric energy had more than doubled, and the unit consumption for each kilowatt-hour had been reduced from 3.2 pounds to 1.83 pounds. Without the improvement in utilization of this fuel—that is, if the 1927 consumption had been at the same unit rate as in 1919—there would have been required in 1927 about 80,000,000 tons of fuel to produce the electric energy sent out. This means a saving of about 34,000,000 tons, or nearly 80 per cent of what was actually burned.

With the greater motorization of manufacturing plants, which has been going on at an accelerating pace since the Armistice, there has come about a gradual and in many cases rapid displacement of low-efficiency engines by the high-efficiency, large units of public utility generating plants. This is shown strikingly in the doubling of the output of public utility plants, whereas normal growth, aside from this displacement, would have been much slower. It is fair to assume also that the continued improvement in fuel utilization in the large plants has been paralleled in some measure in local plants. It might be too much to assume that there has been a *proportionate* increase in efficiency, but that there has been some, and probably a good deal, seems scarcely open to question.

If we put a miner's output at 800 tons of coal a year, the saving of 34,000,000 tons represents the work of over 42,000 miners. This is one-seventh of the high figure given above for excess of miners and more than one-fifth of the earlier estimate.

Thus fuel economies have done more than is commonly reckoned in adding to the soft coal industry's unemployment problem, in which the coal-cutting machine and the large development of water-power have long been regarded as leading factors apart from those created by the workers themselves.

Rapid Advances in Non-Ferrous Metals

ON reflection, it appears that many more important metallurgical advances have taken place in recent years in non-ferrous metals and alloys than in iron and steel. Not that the steel industry has been stagnant. A better understanding of the essential physical and chemical processes involved has undoubtedly produced more and better mill products at a constantly decreasing cost. An army of men are constantly at work improving and controlling production processes. But it is chiefly refinements in detail and perfection of the mechanical equipment that have come in the last fifteen years.

Contrast this with fundamental changes in non-ferrous metallurgy, such as the virtual disappearance of the copper blast furnace, supplanted by the reverberatory for handling fine flotation concentrates—themselves unknown at the turn of the century. Within the last three or four years differential flotation has been able to separate worthless mixed sulphides into marketable ores of lead, copper and zinc. Recently discovered electrolytic zinc is bidding for the market against metal made from bonanza deposits with cheap natural gas fuel.

And we have many new metals ready for use; most notable are hardened aluminum, lead, and now copper. Pure silicon metal has brought an entirely new technique in making aluminum castings—in fact, aluminum has changed from a rarity to a common metal. Many other metals, also, have come out of the electric furnace, and their alloys, with remarkable electric and magnetic properties, have provided practicable heating elements for household devices and industrial ovens and permitted rapid strides in telephony and radio communication.

Others have unique properties as cutting tools or in corrosion-resisting articles. A knowledge of tungsten and its properties has revolutionized electric lighting. Advances in theoretical metallurgy, in the knowledge of crystalline structure in metal, constitutional diagrams, grain growth, the effect of cold work, and the mechanism of fracture have also drawn heavily on data accumulated for metals other than iron.

But rather than extend this list, turn again to iron and steel. Prominent publicity has been given to the growth of alloy steels, but high-speed tool steel dates from the last century. Nickel steel armor plate was made in America nearly forty years ago. Chromium steels were described in detail almost that early. The recent advances, therefore, have not been so much the development of new alloys as the adaptation of the old, and the extension of heat-treatment practices, and even this progress has been largely from the efforts of machinery makers, rather than of the steel producers.

Of course some new and important alloys have been commercialized. Prominent among these are open-hearth iron, silicon irons, molybdenum steel and stainless steels; furthermore, centrifugal casting has made strides, particularly in pipe. We have other things which have received much study, and may be on the verge of more epoch-making applications. Synthetic wrought iron and direct iron or steel come to mind, and fusion welding (a metallurgical operation) has had as yet only a small chance to exert the profound influence it will eventually have on fabrication processes.

Stated broadly, it therefore appears that in the last fifteen to twenty years the steel industry has been busy in perfecting its processes. Expansion in steel has been in an increasing number of applications rather than in a more diverse line of alloys.

On the other hand, some branches of the non-ferrous industry have revolutionized their smelting methods; many new metals have become commercial in fairly pure condition; and a great number of highly important alloys have been developed.

A New Tool for the Foundryman

X-RAYS may become as useful in examining metals as they are in the medical field. For several years their value has been largely theoretical, so far as metals are concerned. Some excellent work has been done in crystal analysis to establish the nature of the structure of metals and the changes which result from heat treatment.

Undoubtedly the detection of flaws in castings by X-ray penetration on a large and economical scale would be of great service to the foundryman. It would forestall the production of many defective castings and cut down losses in machining. Pioneer work in this field was done some years ago at the Watertown Arsenal which revealed some of the possibilities. The leading article in this issue of *THE IRON AGE* gives renewed assurance of what may be expected. Penetration of greater thicknesses of metal are now possible and cheaper but effective apparatus is available. Further progress in these two particulars is confidently expected. There seems little doubt that the foundryman of

the future will have at hand a tool with which he can so regulate his molding practice that the percentage of defective castings, whether ferrous or non-ferrous, can be cut down materially. Non-destructive examination of metals, either with X-rays or by magnetic analysis, bids fair to play an important role in reducing costs and improving the product.

Shading of Steel Extras

YEARs ago a paper was presented to the steel trade decrying the practice more or less prevalent of shading extras and urging that these be maintained rigidly—let the shading, if any, be in the base price. But things have changed. Today a fruitful source of steel market irregularities is the apparent shading of base prices, the extras being technically maintained. Study of individual cases shows plainly that in essence it was the extra which the seller shaded, the quotation being in the form of a cut price base. The seller would not accept an order for material carrying no extras, at the base price named. He quoted with the full understanding that the order if placed would be for material carrying a known and large extra.

For the successful conduct of any line of merchandising reasonably stable prices are essential. The practice of shading the base price when a large extra is involved gives the appearance of an instability which does not really exist. There may be a hundred thousand tons a month made of the general class of material quoted on a given base pricing system and only a thousand tons of the particular product carrying the individual extra. Irregularity in a thousand-ton market is made to appear as irregularity in a hundred-thousand-ton market.

The practice has changed because the times have changed. Under the old régime the steel trade was committed strongly by habit to a system of uniform base prices, with "blanket" contracts made sometimes long in advance and subject to specification from time to time. Often the securing of the specification was like making a fresh sale, which would be accomplished by cutting the extra on the particular lot of material, the contract with its base price remaining intact. Nowadays individual sales are common, and to secure a doubtful prestige or through force of habit or as a result of maneuvers of the buyer the mill quotes a base price at a cut, leaving the extra intact.

To correct such situations the list of extras might be revised to a form in which each extra involves only its proportion of total profit. But there are difficulties in the way. Such a revision as suggested would naturally involve reductions, and reductions occur too often as it is to make the idea of a voluntary reduction attractive.

The adoption of a rigid practice of quoting net prices only in the particular case when a concession is contemplated would be helpful. By no means would this cover the whole matter, for sellers often do so quote and the would-be buyer disingenuously deducts the card extra and claims or infers he has been quoted a cut base price to apply on any specification he cares to make up.

Long ago there was a particularly strained situa-

tion of this sort in the strip market. The way out developed to date has been for the strip market to split itself into width brackets, of which there are now four, and net prices do not graduate smoothly but by jumps. According to the formal quotations, a difference of one-sixteenth inch in width may make a difference of \$2 a ton in the price, which obviously is inconvenient. Yet there seems little hope among producers that a new card could be devised which would admit of a single base price being employed. At any rate the pricing is in the open under the present practice.

Tonnage in a Mature Industry

OFTEN the question is asked "What do you think this year's steel tonnage will be?" The form of the question is natural and proper, but the spirit of the question usually is, how will this year compare in tonnage with last year or year before? Those who expect an answer along that line do not realize what fine distinctions recent years in steel have made, for it is a fact that if this year were to show 47,000,000 tons of steel ingots produced it would make a new record, passing 1927, whereas if it were to show 43,000,000 tons it would take seventh place in the list of years. These two apparent extremes, however, are only 2,000,000 tons or 4.5 per cent away from 45,000,000 tons.

Five per cent is not much leeway for such a forecast, and there is an illustration of how closely distinctions are now made in steel. It is the natural result of steel having reached a maturity. A general principle is involved. In its adolescence an industry grows rapidly, while afterward it grows much less rapidly. An easily applied test is the length of time an industry takes to double its tonnage. Using pig iron as the general measure of the iron and steel industry, about 970,000,000 tons have been made in the United States up to the beginning of this year. Through the year 1912 about 475,000,000 tons had been made, so that it has required nearly fifteen years to make as much more. On Jan. 1, 1911, 51 per cent of all the pig iron made to that date had been made in the preceding decade. Lake Superior iron ore production to date has been about 1,347,000,000 tons, and half of that production has occurred in the past fourteen years, whereas previously production had frequently doubled in much less than a decade.

The steel industry shows the same principle in its details. Nails are a very old commodity. To date about 750,000,000 kegs of cut and wire nails have been produced. Half as large a tonnage had been made up to about the middle of 1910, so that between seventeen and eighteen years have been required for the aggregate to double. Tin plate and strips, on the other hand, are new commodities. Of the total tin plate made, one half has been made in the last nine years, and in strips the time is shorter still.

Outside the steel industry a great divergence is seen between coal, an old industry, and cement, a new industry. It has required the past sixteen and one half years for as much coal to be produced as in all the previous time, while during that period the great bulk of the total cement has been made.

The automobile industry presents a divergence in another respect, for its period of adolescence has been short, and it should be recognized as having already matured. There is no chance of the automobile production of last year and this altogether equaling the combined production of the two preceding years.

When an industry matures, then, as steel has done, its growth is not to be considered by its pace during adolescence. It has become well poised and will show relatively little variation.

Guessing on the Far Future

HENRY FORD in an interview in the March *Forum* makes some remarks about what may occur in the long range future in the world, and indeed out of the world, for he refers to trips to other planets. Samuel Rea, retired president of the Pennsylvania Railroad, in a recent address before the Engineers' Club of Philadelphia, made some definite predictions as to the alinement 50 years hence of rail, water, highway and air transport.

It would be helpful to our current thinking if we had more of this sort of thing. We are disposed to confine our thoughts of the future to what we consider definite predictions, which usually are scarcely more than extrapolation. We observe the course of affairs and then project the graph into the future, giving it such curvature as the record to date suggests. Anything outside of that we consider guessing. But enlightened guessing gives a broader viewpoint and a safer one, for it tends to relieve us of our unknown restrictions.

The euthenists and eugenists are in controversy over the Lamarckian theory that acquired traits are inherited. According to the euthenists better living conditions will result in race improvement, while the eugenists hold that modern conditions are bound to produce race deterioration.

Research in pure science is growing rapidly, seeking new information without predetermined objective, on the principle that discoveries of almost any sort are likely to prove helpful in one way or another. It is urged that this research furnishes the most practical promise of solving the problem of how all of us can be kept gainfully employed when improvements are tending year by year to release workers, since the old commodities and forms of service require fewer workers per unit of accomplishment.

Along still another line, it is regrettable that only a conspicuous lack of visible progress is to be mentioned. At the beginning of this century the prediction was made that while the nineteenth century had been one of astonishing progress in material things, the twentieth century would be marked by men learning how really to think, so that a whole new practice in using the human brain would be set up. More than a fourth of the century has passed and we see no general progress in this respect. Rather it is urged that for the most part people think less than ever. James Harvey Robinson's admirable work "The Mind in the Making" was read or usefully applied only by those who least needed it, and his plea for "the humanizing of knowledge" has not brought results among the people.

The very difficulties in the way of looking into the future except by mechanically carrying forward for a few years the trends currently visible should be a great spur to enlightened guessing. It is easy to observe that even our present methods, had they been applied in the past, would have failed largely or wholly to project affairs into the condition in which we now find them.

"Where there is no vision the people perish."

For Higher Canadian Steel Duty

THE Canadian steel industry last year produced slightly more than 900,000 tons of steel ingots and imported from the United States 832,984 tons of finished steel. The fact that Canada buys from us an amount of steel about equal to that which is made in its own plants has frequently stirred the critics of our neighbor Government to attacks on the tariff policy which makes possible such large importations, particularly in view of Canada's unfavorable trade balance with the United States. The subject was recently introduced at length by the member of the House of Commons from Algoma, the district in which the plant of the Algoma Steel Corporation is located.

Canada's steel industry, said the member from Algoma, has for some years "had its back to the wall fighting for its very existence against the mass production of the United States and the production of the mills of Europe, where the standard of living is very much lower than it is in Canada."

The present duty on steel products imported by Canada is a specific duty. An ad valorem duty will probably be urged as a measure of greater protection. But it is in the matter of freight rates that Canadian steel plants suffer their principal disadvantage in competition with mills of the United States. The freight rate on steel bars and structural sections from Buffalo to Chatham, Ont., for example, is 26½c. per 100 lb., as compared with 41½c. per 100 lb. on the same material from Sault Ste. Marie, Ont. Thus, the tariff protection which the Canadian steel industry enjoys on structural shapes—15c. per 100 lb. on sections weighing 35 lb. per yard and over—is wiped out by this freight rate disadvantage.

St. Catharines, Ont., is one of the principal pig iron consuming centers in Canada. It draws much of its pig iron from Buffalo on a freight rate of \$2.30 per ton as against a rate of \$4.90 per ton from Sault Ste. Marie. The present duty on pig iron is \$2.80 per ton.

These facts are among the arguments that have been set forth in the House of Commons in support of a higher tariff on pig iron and steel. Moreover, the money value of Canada's iron and steel imports rose from \$134,684,441 in 1925 to \$229,429,485 in 1927, a gain of nearly \$100,000,000, which serves to explain the efforts that may be put forth to change Canada's tariff to an ad valorem basis.

Specific recommendation has been made that the present schedule providing a drawback of 99 per cent on flat spring steel, steel billets and steel axle bars, when used in the manufacture of springs and axles other than for railroad and tramway vehicles, be amended to exclude automobile manufacturers as well as railroads from this provision. It is further recommended that a tariff be placed on

alloy steel bars, not now covered by any specific item in Canada's tariff schedule; also that the tariff on structural sections be amended to include large sizes which were not made in Canada when the tariff was drafted.

Back of the agitation across the border for greater tariff protection is the desire of the owners of Canadian mills to enlarge their facilities. The Algoma Steel Corporation, it is stated, is prepared to expend \$10,000,000 for new plant, which will include the installation of a mill to roll structural sections larger than any now made in Canada. The recent acquisition of the British Empire Steel Corporation by strong Canadian banking interests has given rise to reports of contemplated plant expansion, which presumably depends somewhat on the success of the move to amend the tariff.

Steel for Normal Building Needs

CONSTRUCTION in the United States in 1928 will probably amount to more than \$7,400,000,000, according to a recent forecast by *Building Age* and *National Builder*. In analyzing this figure the survey points out that it coincides roughly with a typical building year and adds that since 1924 the industry has not been engaged in making up for war-time shortages. In other words, nearly seven and one-half billion dollars is being spent yearly to take care of the needs of the average annual increase in population.

This increase, according to the Census Bureau, amounts to 2,250,000 persons, requiring more than 500,000 new homes yearly. The *Building Age* survey points out that 86 per cent of our population lives in single-family dwellings, 8.6 per cent in two-family houses and 5.4 per cent in multi-family buildings or apartments. By establishing conservative cost figures for each of these types of dwellings it is estimated that residential construction requires an annual expenditure of about \$3,200,000,000. But dwellings represent in value less than 68 per cent of all classes of buildings, making the amount of all new construction necessary to provide for natural population increase over \$4,700,000,000. One-third of all construction, the survey states, goes into replacements, alterations and repairs to existing structures. This is how we run up an annual building bill of \$7,400,000,000.

Such an enormous outlay for new construction naturally opens up a large and diversified market for steel products. That the industry is taking advantage of this market is evidenced by THE IRON AGE distribution figures for 1927 which showed that more than 7,000,000 tons of steel, or 22 per cent of the country's total finished product, went into building. This was the largest aggregate taken by any steel-consuming industry.

In 1926 new construction required 6,800,000 tons or 19½ per cent of the year's steel output, and in 1925, 5,600,000 tons or 17½ per cent. Thus during the last three years, or since the construction industry has been building for normal population requirements rather than making up shortages, a steadily increasing amount of steel has been taken; and each year this tonnage has represented a larger percentage of the total production of finished steel.

Sharp Gain in February Iron Output

Actual Data Show Daily Rate Increased 7431 Tons or About
8 Per Cent Over January—Net Gain of Two Furnaces

COMPILATION of the actual data for the pig iron output in February shows the total to have been 2,900,126 gross tons or 100,004 tons per day. This is 364 tons per day higher than the estimated output of 99,640 tons per day published last week. Thus the actual gain in February over January was 7431 tons per day, or nearly 8 per cent. This compares with a gain in January over December of 5613 tons per day, or 6.4 per cent.

Total February pig iron output of 2,900,126 tons or 100,004 tons per day for the 29 days, compares with 2,869,761 tons or 92,573 tons per day for the 31 days in January. The February production last year was 105,024 tons per day. This year's February output is the smallest February since 1922.

Net Gain of Two Furnaces

Gain in active furnaces was only two. Eight furnaces were blown in and six were shut down. This compares with a net gain of 16 in January. Of the eight furnaces blown in last month, six were Steel Corporation stacks and two were merchant. Only one Steel Corporation furnace was blown out, making the net gain for that company five. There were four merchant

stacks and one independent steel company stack shut down.

Capacity Active on March 1

On March 1 there were 187 furnaces active as compared with 185 on Feb. 1. The estimated daily operating rate of the 187 furnaces on March 1 was 100,060 tons; the 185 furnaces on Feb. 1 had an estimated operating rate of 99,640 tons per day.

Manganese Alloy Output

Production of ferromanganese in February was 19,320 tons; this compares with 22,298 tons made in January. Two companies made spiegeleisen last month but it is not possible to make public the actual data.

Possibly Active Furnaces Reduced

The Carnegie Steel Co. has dismantled its No. 1 Newcastle furnace in the Shenango Valley, thereby reducing the number of possibly active blast furnaces in the United States from 350 to 349.

Furnaces Blown In and Out.

Furnaces blown in during February include one Edgar Thomson furnace of the Carnegie Steel Co. in the

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works	Merchants*	Total
February	80,595	24,429	105,024
March	86,304	26,062	112,366
April	87,930	26,144	114,074
May	84,486	24,899	109,385
June	78,110	24,878	102,988
July	69,778	25,421	95,199
August	71,413	23,660	95,073
September	69,673	22,825	92,498
October	66,991	22,819	89,810
November	64,600	23,679	88,279
December	64,118	22,742	86,860
January, 1928	69,520	23,053	92,573
February	78,444	21,560	100,004

*Includes pig iron made for the market by steel companies.

Pig Iron Production by Districts, Gross Tons

	Feb. (29 days)	Jan. (31 days)	Dec. (31 days)	Nov. (30 days)
New York and Mass.	204,744	203,715	199,726	212,778
Lehigh Valley	75,394	72,639	74,316	75,748
Schuylkill Valley	44,861	43,946	44,238	53,269
Lower Susq. and Lebanon Valleys	29,387	30,338	32,289	30,150
Pittsburgh district	597,543	582,497	523,875	495,005
Shenango Valley	90,179	77,023	58,982	64,752
Western Penna.	86,725	89,372	92,774	92,000
Maryland, Virginia and Kentucky	89,803	94,590	92,981	91,300
Wheeling district	118,108	108,188	114,030	110,055
Mahoning Valley	261,837	247,371	222,572	223,617
Central and North- ern Ohio	294,427	313,697	295,179	306,395
Southern Ohio	24,773	32,480	32,413	32,750
Illinois and Indiana	639,763	608,771	537,892	508,545
Mich., Minn., Mo., Wis., Colo. and Utah	130,586	134,718	140,141	126,287
Alabama	207,108	224,132	227,775	219,478
Tennessee	4,888	6,284	6,572	6,247
Total	2,900,126	2,869,761	2,695,755	2,648,376

Daily Average Production of Coke Pig Iron in the United States by Months Since Jan. 1, 1924—Gross Tons

	1924	1925	1926	1927	1928
Jan.	97,384	108,720	106,974	100,123	92,573
Feb.	106,026	114,791	104,408	105,024	100,004
Mar.	111,809	114,975	111,032	112,366	.....
Apr.	107,781	108,632	115,004	114,074	.....
May	84,358	94,542	112,304	109,385	.....
June	67,541	89,115	107,844	102,988	.....
½ year	95,794	105,039	109,660	107,351	.....
July	57,577	85,936	103,978	95,199	.....
Aug.	60,875	87,241	103,241	95,073	.....
Sept.	68,442	90,873	104,543	92,498	.....
Oct.	79,907	97,528	107,553	89,810	.....
Nov.	83,656	100,767	107,890	88,279	.....
Dec.	95,539	104,853	99,712	86,860	.....
Year	85,075	99,735	107,043	99,266	.....

Coke Furnaces in Blast

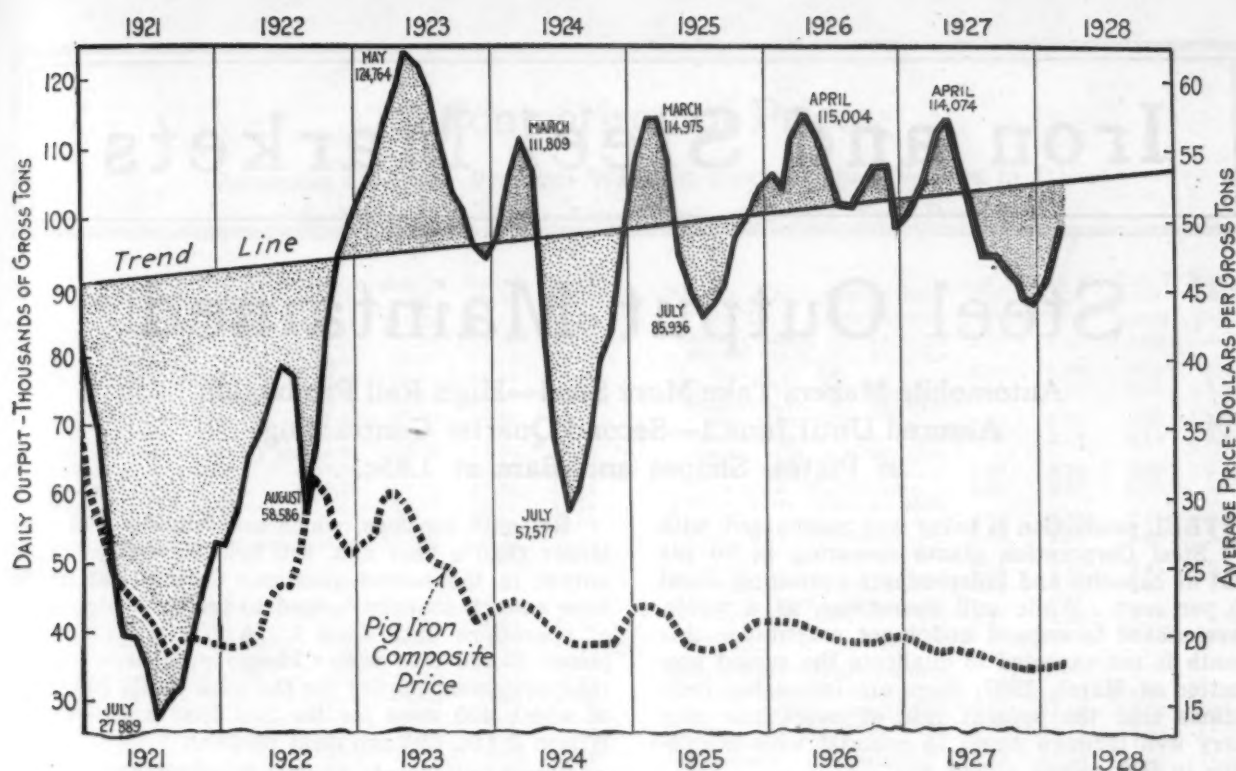
	March 1 Number in Blast	Capacity per Day	Feb. 1 Number in Blast	Capacity Per Day
New York:				
Buffalo	12	5,910	12	5,795
Other N. Y. and Mass.	3	1,150	3	1,105
New Jersey	0	.....	0	.....
Pennsylvania:				
Lehigh Valley	5	2,600*	5	2,430*
Schuylkill Valley	4	1,545	4	1,415
Susquehanna Valley	2	945	2	910
Ferromanganese	1	65	1	70
Lebanon Valley	0	.....	0	.....
Ferromanganese	0	.....	0	.....
Pittsburgh District	33	20,550	33	19,800
Ferro. and Spiegel	1	240	1	250
Shenango Valley	6	3,100	6	2,840
Western Pennsylvania	5	2,580	5	2,485
Ferromanganese	2	420	2	400
Maryland	5	2,500	5	2,470
Wheeling District	7	4,200	6	3,490
Ohio:				
Mahoning Valley	15	9,030	15	8,700
Central and Northern	17	9,830	18	10,230
Southern	3	865	4	1,045
Illinois and Indiana	35	22,270	33	21,200
Mich., Wis. and Minn.	6	2,770	6	2,680
Colo., Mo. and Utah	4	1,600*	4	1,645*
The South:				
Virginia	1	225	1	215
Kentucky	1	370	1	365
Alabama	17	6,840	17	6,900
Tennessee	2	465	1	200
Total	187	100,060	185	96,640

*Includes spiegeleisen.

Production of Coke Pig Iron in United States by Months, Beginning Jan. 1, 1926—Gross Tons

	1926	1927	1928
Jan.	3,316,201	3,103,820	2,869,761
Feb.	2,923,415	2,940,679	2,900,126
Mar.	3,441,986	3,483,362	.....
Apr.	3,450,122	3,422,226	.....
May	3,481,428	3,390,940	.....
June	3,235,309	3,089,651	.....
½ year	19,848,461	19,430,678	.....
July	3,223,338	2,951,160	.....
Aug.	3,200,479	2,947,276	.....
Sept.	3,136,293	2,774,949	.....
Oct.	3,334,132	2,784,112	.....
Nov.	3,236,707	2,648,376	.....
Dec.	3,091,060	2,695,755	.....
Year*	39,070,470	36,232,306	.....

*These totals do not include charcoal pig iron. The 1926 production of this iron was 163,880 tons.



Daily Pig Iron Output in February Was 8.0 Per Cent More Than in January; Composite Price Increases Slightly

Inclined line represents the gradually increasing theoretical needs of the country, and shows that production is now below the so-called normal. Dotted line represents THE IRON AGE composite price

	Total Iron Spiegel and Ferro		1927		1928	
	Fe-Mn	Spiegel	Fe-Mn	Spiegel	Fe-Mn	Spiegel
Jan. ...	2,343,881	2,155,133	31,844	7,486	22,298	†....
Feb. ...	2,256,651	2,274,880	24,560	7,045	19,320	†....
Mar. ...	2,675,417	...	27,834	7,650	...	...
Apr. ...	2,637,919	...	24,735	12,907	...	...
May ...	2,619,078	...	28,734	9,788	...	...
June ...	2,343,409	...	29,232	10,535	...	...
½ year...	14,876,355	...	166,939	55,411	...	...
July ...	2,163,101	...	26,394	9,350	...	...
Aug. ...	2,213,815	...	21,279	9,104	...	...
Sept. ...	2,090,200	...	20,675	6,037	...	...
Oct. ...	2,076,722	...	17,710	6,129	...	...
Nov. ...	1,938,043	...	17,851	6,521	...	...
Dec. ...	1,987,652	...	20,992	6,816	...	...
Year...	27,345,888	...	291,840	99,368	...	...

*Includes output of merchant furnaces.
†Data not available.

Pittsburgh district; one Newcastle furnace of the Carnegie Steel Co. and one Shenango furnace in the Shenango Valley; one Mingo furnace of the Carnegie Steel Co. in the Wheeling district; one South Chicago furnace of the Illinois Steel Co. and one Gary furnace in the Chicago district; one Bessemer furnace of the Tennessee Coal, Iron & Railroad Company in Alabama, and the Rockdale furnace in Tennessee.

Furnaces shut down during February were one Carrie furnace of the Carnegie Steel Co. in the Pittsburgh district; one Shenango furnace and the Stewart furnace in the Shenango Valley; one River furnace in northern Ohio; the Belfont furnace in southern Ohio, and one City furnace of the Sloss-Sheffield Steel & Iron Co. in Alabama.

Blast Furnace at Cleveland Makes 283,899 Tons of Iron in Year

A blast furnace output of 283,899 tons was made by the A furnace of the Central furnaces of the American Steel & Wire Co., Cleveland, during 1927, which established a production record for a Steel Corporation furnace and is believed to have set a tonnage record never before attained by any blast furnace. This stack is also making a remarkable production record on one

lining. It has been in operation with its present lining since March 17, 1924, and has produced in that time 875,000 tons of pig iron. During the nearly four-year period it was banked twice. It is expected to produce 1,000,000 tons of pig iron before it will have to go out of blast for relining. Its best record for one day, 1003 tons, was made July 22, 1926.

Commercial Standard for Chain Link Fence Adopted by Industry

A general conference on chain link fence and chain link fabric held in Cleveland, Jan. 10, adopted a commercial standard for this commodity, according to an announcement of the assistant director in charge of commercial standards group, Bureau of Standards, Washington.

Prior to the adoption of this commercial standard, which includes simplification of sizes and dimensions, the fence was produced in the following heights: 3½, 4, 4½, 5, 5½, 6, 6½, 7, 7½, 8, 9, 10, 11 and 12 ft. The standard heights are now: 5, 6, 7, 8, 9 and 10 ft. Gages 6, 7, 8, 9, 9½, 10, 11, 12 and 14 were formerly used, but have now been reduced to 6, 9 and 11.

Meshes formerly in 1½, 1¾, 2, 2¼, 2½ in. sizes are simplified to 1¾ and 2 in. The approximate percentages of reduction in heights, gages and meshes are as follows: Heights, 57 per cent; gages, 66 per cent; meshes, 60 per cent.

The conference appointed the following members on the standing committee to serve as a liaison between the Department of Commerce and industry: J. H. Kinney, Cyclone Fence Co., Waukegan, Ill.; W. T. Kyle, Page Steel & Wire Co., Bridgeport, Conn., and H. G. Thomson, Anchor Post Fence Co., Baltimore, to represent manufacturers; T. C. Potts, Horace T. Potts Co., Philadelphia; W. J. Thwing, Security Fence Co., Summerville, Mass., and A. R. Dinn, P. H. Dinn & Co., Boston, to represent the distributors; and National Electric Light Association, American Railway Association and Bureau of Yards and Docks, Navy Department, to represent the organized consumers.

This recommendation became effective Jan. 15, subject to annual revision by a similar conference or the standing committee.

Iron and Steel Markets

Steel Output Maintained

Automobile Makers Take More Steel—High Rail Production
Assured Until June 1—Second Quarter Contracting
in Plates, Shapes and Bars at 1.85c.

STEEL production is being well maintained, with Steel Corporation plants operating at 90 per cent of capacity and independents averaging about 80 per cent. While mill operations, as a whole, have ceased to expand and ingot output for this month is not expected to duplicate the record production of March, 1927, there are increasing indications that the present rate of operations may carry well through April, in contrast with the decline in that month a year ago.

The unfilled tonnage statement of the Steel Corporation, as of March 1, will probably show little change, owing to heavy shipments in February. So far this month, also, shipments continue to balance bookings for most mills, leaving backlogs undiminished. There are, of course, some exceptions both with respect to districts and commodities. At Chicago, where the week's specifications are the fourth largest in the past two years, shipping orders exceed ingot production, which is at a 95 per cent rate. In the Philadelphia district, where specifying has been lagging, more tonnage is being released for rolling than in February. At Pittsburgh some recession in specifications for heavier rolled products is reported, and it is inferred that buyers have accumulated enough stock so that further releases against low-priced contracts can be timed to carry shipments over into April.

Among individual rolled products, sheets have shown a marked gain in specifications. February tonnage releases received by the leading sheet maker were equal to 90 per cent of capacity, and for the first week in March actually exceeded full theoretical capacity. Both the automotive industry and farm implement makers are pressing for deliveries of sheets, as well as bars. Youngstown district mills are finding it necessary to operate extra turns to satisfy the increasing requirements of automobile builders, which in virtually no cases represent anticipated needs. In fact, many motor car plants are depending on daily deliveries to maintain their production schedules.

Steel prices show little change, following recent advances. The increase of \$1 a ton to 1.90c., Pittsburgh, on plates, shapes and bars is not yet fully established, since some mills allowed their customers to cover for both early and second quarter needs at the previous price of 1.85c. In other products, outside of rails and tin plate, there has been little contracting for second quarter. Automobile companies, in many cases, are limiting forward purchases to their April requirements.

Makers of wire products and wire rods have opened books for second quarter at unchanged prices. Leading producers of large rivets have announced an advance of \$3 a ton, effective at once. Steel tie plates, on the other hand, have generally declined \$2 a ton to \$43, mill.

Rail mill backlogs, which are fully 300,000 tons larger than a year ago, will help to sustain ingot output in the second quarter. Chicago rail mills have enough tonnage booked to insure a high rate of operations until June 1. A Western road has placed 13,000 tons with Chicago producers. Railroad equipment buying for the week totals 700 cars, of which 400 were for the Soo Line and 300 for Wilson & Co., Chicago meat packers.

Structural awards amount to 45,000 tons, while more than 40,000 tons was added to work under negotiation. Principal contracts were 5200 tons for a loft building in New York, 5000 tons for a building in Pittsburgh and 4500 tons for a club building in Chicago. Inquiries include 4800 tons for Mississippi River barges, 4000 tons for a department store at Oakland, Cal., and 5000 tons for subway work in New York, while 10,000 tons for subway work, on which bids recently went in, will be awarded within a few days.

Storage tanks ordered by three Texas oil producers call for a total of 12,000 tons of plates. Demand for oil country pipe, however, is slow, and while heavier orders for pipe for building work are looked for with the approach of spring, it is doubtful whether the expansion will be as great as usual. Distribution of pipe to a larger extent than in recent years is on consignee accounts, which have been well rounded out by mills since the first of the year.

Pig iron is fairly active at Chicago and Cleveland and in the New York district, but elsewhere is dull, being almost at the point of stagnation at Pittsburgh and in the Valleys. Prices are unchanged, but concessions on Buffalo iron are appearing more frequently at competitive points, while the adherence of eastern Pennsylvania furnaces to a \$20 base resulted in the placing of 2000 tons of foundry grades by a Gloucester, N. J., melter with two outside furnaces and an importer at slightly lower prices.

Cast iron pipe prices again have weakened, notably in the Chicago district, where municipal business has brought out a bid of \$26.70, Birmingham, on 8 and 12-in. sizes, while in the East the low prices of Northern foundries are discouraging Southern competition.

Scrap is weak in nearly all large consuming and producing districts. The heavy production of scrap by automobile companies has been reflected in lower prices at Middle West consuming centers.

Both of THE IRON AGE composite prices remain unchanged for the fourth consecutive week, that for pig iron at \$17.75 a ton and that for finished steel at 2.364c. a lb. Steel is close to its level of one year ago, but pig iron is down \$1.21 a ton.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At Date, One Week, One Month, and One Year Previous

Pig Iron, Per Gross Ton:	Mar. 6, 1928	Feb. 28, 1928	Feb. 7, 1928	Mar. 8, 1927
No. 2, fdy., Philadelphia...	\$20.76	\$20.76	\$20.26	\$21.76
No. 2, Valley furnace.....	17.25	17.25	17.25	18.50
No. 2, Southern, Cin'ti....	19.69	19.69	19.69	21.69
No. 2, Birmingham.....	16.00	16.00	16.00	18.00
No. 2 foundry, Chicago*...	18.50	18.50	18.50	20.00
Basic, del'd eastern Pa. ...	19.50	19.50	19.60	21.00
Basic, Valley furnace....	17.00	17.00	17.00	18.00
Valley Bessemer, del'd P'gh	19.26	19.26	19.26	21.26
Malleable, Chicago*.....	18.50	18.50	18.50	20.00
Malleable, Valley.....	17.25	17.25	17.25	18.50
Gray forge, Pittsburgh...	18.51	18.51	18.51	19.76
L. S. charcoal, Chicago...	27.04	27.04	27.04	27.04
Ferromanganese, furnace...	100.00	100.00	100.00	100.00

Rails, Billets, etc., Per Gross Ton:	Mar. 6, 1928	Feb. 28, 1928	Feb. 7, 1928	Mar. 8, 1927
O-h. rails, heavy, at mill...	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Bess. billets, Pittsburgh...	33.00	33.00	33.00	34.00
O-h. billets, Pittsburgh...	33.00	33.00	33.00	34.00
O-h. sheet bars, P'gh....	34.00	34.00	34.00	34.00
Forging billets, P'gh....	38.00	38.00	38.00	40.00
O-h. billets, Phila.....	38.30	38.30	38.30	38.30
Wire rods, Pittsburgh....	44.00	44.00	42.00	43.00
Skelp, grvd. steel, P'gh, lb.	1.85	1.85	1.85	1.90

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	2.12	2.12	2.12	2.12
Iron bars, Chicago.....	1.90	1.90	1.90	2.00
Steel bars, Pittsburgh...	1.85	1.85	1.85	1.90
Steel bars, Chicago.....	1.95	1.95	1.95	2.00
Steel bars, New York....	2.19	2.19	2.19	2.24
Tank plates, Pittsburgh...	1.85	1.85	1.85	1.85
Tank plates, Chicago.....	1.95	1.95	1.95	2.00
Tank plates, New York....	2.17½	2.17½	2.17½	2.19
Beams, Pittsburgh.....	1.85	1.85	1.85	1.90
Beams, Chicago.....	1.95	1.95	1.95	2.00
Beams, New York.....	2.14½	2.14½	2.14½	2.19
Steel hoops, Pittsburgh...	2.20	2.20	2.20	2.30

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Mar. 6, 1928	Feb. 28, 1928	Feb. 7, 1928	Mar. 8, 1927
Sheets, black, No. 24, P'gh	2.90	2.90	2.90	2.75
Sheets, black, No. 24, Chi-				
cago dist. mill.....	3.00	3.00	3.00	2.95
Sheets, galv., No. 24, P'gh	3.65	3.65	3.65	3.65
Sheets, galv., No. 24, Chi-				
cago dist. mill.....	3.85	3.85	3.85	3.85
Sheets, blue, 9 & 10, P'gh	2.10	2.10	2.10	2.20
Sheets, blue, 9 & 10, Chi-				
cago dist. mill.....	2.20	2.20	2.20	2.30
Wire nails, Pittsburgh...	2.65	2.65	2.55	2.55
Wire nails, Chicago dist.				
mill.....	2.70	2.70	2.60	2.60
Plain wire, Pittsburgh...	2.50	2.50	2.40	2.40
Plain wire, Chicago dist.				
mill.....	2.55	2.55	2.45	2.45
Barbed wire, galv., P'gh...	3.35	3.35	3.25	3.25
Barbed wire, galv., Chi-				
cago dist. mill.....	3.40	3.40	3.25	3.30
Tin plate, 100 lb. box, P'gh	\$5.25	\$5.25	\$5.25	\$5.50

Old Material, Per Gross Ton:	Mar. 6, 1928	Feb. 28, 1928	Feb. 7, 1928	Mar. 8, 1927
Heavy melting steel, P'gh...	\$14.75	\$14.75	\$15.00	\$16.50
Heavy melting steel, Phila.	13.50	13.50	13.50	14.50
Heavy melting steel, Ch'go	12.75	12.75	12.50	12.75
Carwheels, Chicago.....	14.00	14.00	14.00	15.00
Carwheels, Philadelphia...	15.50	15.50	15.50	16.00
No. 1 cast, Pittsburgh...	14.50	14.50	14.50	15.75
No. 1 cast, Philadelphia...	16.00	16.00	16.00	17.00
No. 1 cast, Ch'go (net ton)	14.50	14.50	14.50	16.50
No. 1 RR. wrot, Phila....	15.00	15.00	15.25	17.00
No. 1 RR. wrot, Ch'go (net)	11.00	11.00	11.00	12.00

Coke, Connellsville, Per Net Ton at Oven:	Mar. 6, 1928	Feb. 28, 1928	Feb. 7, 1928	Mar. 8, 1927
Furnace coke, prompt....	\$2.60	\$2.60	\$2.60	\$3.50
Foundry coke, prompt....	3.75	3.75	3.75	4.50

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York...	14.25	14.20	14.25	13.50
Electrolytic copper, refinery	14.00	13.75	13.87½	13.12½
Zinc, St. Louis.....	5.50	5.45	5.65	5.77½
Zinc, New York.....	5.85	5.80	6.00	7.12½
Lead, St. Louis.....	5.75	5.90	6.22½	7.35
Lead, New York.....	6.00	6.15	6.50	7.65
Tin (Straits), New York...	51.62½	51.75	53.25	70.00
Antimony (Asiatic), N. Y.	10.25	10.25	11.00	13.00

Pittsburgh

Some Slackening in Steel Demand But Volume is Not Appreciably Affected

PITTSBURGH, March 6.—The showing of the steel market over the first two months of the year compares favorably in business, production and shipments with the same period last year. In shipments, this year has been somewhat better than 1927, since it was not until about the middle of February last year that the movement began to show real volume, while this year shipments began to mount very promptly in January and continued at a high rate through February. Some slackening in the past week has not appreciably reduced the volume of the outward movement from the mills. This month is starting a little more quietly than either January or February and generally the trade is not looking for March to equal in business that month last year, which was the record month of all time in production and shipments. On the other hand, it is not expected that April will show quite the sharp recession that April, last year, did, and it is rather generally expected that for the first four months of the year there will be little variation from the business of that period last year.

In a number of finished steel products, specifications still are pouring in very freely, sheets being a notable example, but in others shipping instructions are for definitely smaller tonnages than was the case recently. The price question enters into these cases. In plates, bars, shapes, strips and wire products, consumers are covered for this quarter at prices well under those

now asked and, having taken shipments fairly liberally so far this year, there are some instances where stocks are sufficient to permit of conservation of low-priced tonnage for specification between now and the end of the month for April shipment. It perhaps is no exaggeration to say that it will probably be May before many of the steel manufacturers begin to derive full benefit of the higher prices that have been announced since the opening of the year. The second quarter promises to be highly interesting for the steel trade.

No change is noted in the rate of steel works' operations and in the rolling mills schedules, the alignment is much as it has been recently, with pipe mill operations making the poorest showing, since jobbers serving the building and construction industry have not yet made much of a reduction in their stocks and the oil industry is yet to evince much interest in drill and drive pipe and casing. The automobile industry still stands out as the heaviest user of steel, although its takings as a whole still are under what they were expected to be by this time because of the failure of a maker of low-priced cars to get up production as rapidly as was expected. Agricultural implement manufacturers are busy and buying a lot of steel. Except for rail tonnage, railroad business in this district is disappointing and other districts appear to be doing better in structural work than this.

Inactivity still rules in the pig iron market and prices appear to be maintained largely by reason of an absence of selling pressure. The scrap market is a small-lot affair with only moderate interest on the part of consumers. The depression in the coal industry continues. There are some hopes that the opening of Lake navigation will create a market for Pittsburgh district coal, but also fears that the starting up of mines to

supply such a demand would bring labor troubles. Moreover, Southern mines are not going to surrender the business without a struggle.

Pig Iron.—Except for a sale of 500 tons of foundry iron to the Westinghouse Electric & Mfg. Co. for delivery over the remainder of this quarter to its Trafford, Pa., works, it has been an uneventful week in this market. There is some doubt as to the price paid for this lot, but it is generally believed to have been at the regular price of \$17.25, Valley furnace, for No. 2 grade. Small lots of malleable iron have been moving at that price and carload lots of Bessemer have been sold in the week at \$17.50. On the former, however, \$17.25 appears to be all that the market will yield and there is no longer much basis for a higher quotation.

W. P. Snyder & Co. report February average prices of basic and Bessemer iron from Valley furnaces as \$17 and \$17.50, unchanged from the month before.

Prices per gross ton, f.o.b. Valley furnace:

Basic	\$17.00
Bessemer	17.50
Gray forge	16.75
No. 2 foundry	17.25
No. 3 foundry	16.75
Malleable	17.25
Low phosphorus, copper free.....	27.00

Freight rate to the Pittsburgh or Cleveland district, \$1.76.

Ferroalloys.—Good movement is noted of the commonly-used ferroalloys on contracts, but new business amounts to little. There is no change in prices.

Semi-Finished Steel.—Makers of billets, slabs and sheet bars are talking about higher prices on second quarter tonnages, but on such business as has been done in the past week, which included one fair-sized lot of small billets, recent prices have ruled. Youngstown mills feel the Cleveland mill competition on sheet bars and seem disposed to wait for some signs of strength in that market before taking a stand on prices. All local producers of wire rods are quoting \$44, base, Pittsburgh or Cleveland, on spot or second quarter tonnages, but only a few spot demands are developing and consumers are not yet interested in second quarter requirements.

Bars, Plates and Shapes.—The first week of the new month has not been marked by quite as much activity in specifications as there had been over much of the first two months of the year. In some quarters there is a belief that consumers have become fairly well supplied as a result of heavy deliveries over the past six or eight weeks, and now are in a position to reduce their specifications. Contract buyers have until the end of the month to send in specifications on orders carrying a price of 1.80c., base Pittsburgh, and are believed to be holding back some tonnage for April shipment. Bar specifications are still good, though slightly less in volume than they have been. Steel for 41 barges to be built for the Mississippi River Commission, amounting to 4800 tons of plates and small shapes, will be rolled here. Steel for the Fort Lee bridge, New

York City, is being fabricated. The larger fabricating shops are well supplied with business, but the smaller ones appear to need orders. As yet, 1.90c., base, is more of a small than a large-lot price.

Rails and Track Supplies.—Local makers now are quoting tie plates at \$43 per net ton, a cut of \$2 a ton. Recent prices are holding on the other track accessories, but business is not very active. Standard-section rails are moving well on 1928 contracts. Not much activity is noted in light-section rails.

Wire Products.—Makers quite generally have opened books for second quarter business at unchanged prices, or \$2.65 per keg, base Pittsburgh, for nails and \$2.50 per 100 lb., base, for plain wire. A little business for that period has been written at these levels, which represent an advance of \$2 a ton over the contract prices for this quarter. Makers report very steady specifying against contracts and enough business to sustain mill operations of 65 to 70 per cent of capacity.

Tubular Goods.—The pipe market still is dull. While an increase in orders for pipe for building and construction is expected with the approach of spring, it is doubtful if the expansion will be as great as usual, for the reason that distribution, now more than in recent years, is on consignee accounts, and since the first of the year such accounts have been rounded out and built up by the mills. This leaves only the replacement of pipe sold to supply new mill orders. Oil country pipe still is slow of sale, and the several large gas pipe lines that have been mentioned in recent weeks are not much nearer the mills than they were when first broached. Only a fair demand is noted for boiler tubes, but mechanical tubing is going well. Prices continue irregular.

Sheets.—February tonnage releases received by the leading producer were equal to approximately 90 per cent of its productive capacity, and for the first week of March they have actually exceeded full theoretical capacity, with the result that on some finishes, notably blue annealed sheets, it cannot promise much earlier than April delivery on new orders. Several of its plants engaged on automobile body sheets are fully obligated against this month's production. Independent companies also are faring well, and some of them producing full-finished sheets are working their mills as many as 18 turns a week to keep up with the demands of the motor car builders. There are occasional deviations from 2.90c., base Pittsburgh, on black sheets and some irregularity still is noted in galvanized sheets, but the market is firm on blue annealed sheets and is holding well on electrical sheets. Agricultural implement manufacturers are very insistent for supplies, even more so than the motor car builders, although a much larger tonnage is going to the latter.

Tin Plate.—Specifications on contracts are still fairly heavy and mill operations hold up to 80 per cent of capacity, with enough business in sight to sustain that rate until April quotas are fully specified. It is

THE IRON AGE Composite Prices

Finished Steel March 6, 1928, 2.364c. a Lb.

One week ago.....	2.364c.
One month ago.....	2.350c.
One year ago.....	2.367c.
10-year pre-war average.....	1.689c.

Based on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 86 per cent of the United States output of finished steel.

	High		Low	
1928	2.364c.,	Feb. 14:	2.314c.,	Jan. 3
1927	2.453c.,	Jan. 4:	2.293c.,	Oct. 25
1926	2.453c.,	Jan. 5:	2.403c.,	May 18
1925	2.560c.,	Jan. 6:	2.396c.,	Aug. 18
1924	2.789c.,	Jan. 15:	2.460c.,	Oct. 14
1923	2.824c.,	Apr. 24:	2.446c.,	Jan. 2

Pig Iron March 6, 1928, \$17.75 a Gross Ton

One week ago.....	\$17.75
One month ago.....	17.67
One year ago.....	18.96
10-year pre-war average.....	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1928	\$17.75,	Feb. 14:	\$17.54,	Jan. 3
1927	19.71,	Jan. 4:	17.54,	Nov. 1
1926	21.54,	Jan. 5:	19.46,	July 13
1925	22.50,	Jan. 13:	18.96,	July 7
1924	22.88,	Feb. 26:	19.21,	Nov. 3
1923	30.86,	Mar. 20:	20.77,	Nov. 20

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base Per Lb.
F.o.b. Pittsburgh mills.....	1.85c. to 1.90c.
F.o.b. Chicago.....	1.95c. to 2.10c.
Del'd Philadelphia.....	2.17c. to 2.22c.
Del'd New York.....	2.19c. to 2.24c.
Del'd Cleveland.....	2.04c. to 2.09c.
F.o.b. Cleveland.....	1.85c. to 1.90c.
F.o.b. Lackawanna.....	1.95c.
F.o.b. Birmingham.....	2.05c. to 2.15c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills.....	1.90c. to 2.00c.
F.o.b. Birmingham.....	2.05c. to 2.15c.

Rail Steel

F.o.b. mills east of Chicago district.....	1.75c.
F.o.b. Chicago Heights mill.....	1.80c. to 1.85c.

Iron

Common iron, f.o.b. Chicago.....	1.90c. to 2.00c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.12c.
Common iron, del'd New York.....	2.14c.

Tank Plates

Base Per Lb.

F.o.b. Pittsburgh mills.....	1.85c. to 1.90c.
F.o.b. Chicago.....	1.95c. to 2.10c.
F.o.b. Birmingham.....	2.05c. to 2.15c.
Del'd Cleveland.....	2.04c. to 2.09c.
Del'd Philadelphia.....	2.10c. to 2.15c.
F.o.b. Coatesville.....	2.00c. to 2.05c.
F.o.b. Sparrows Point.....	2.00c.
F.o.b. Lackawanna.....	1.95c.
Del'd New York.....	2.17½c. to 2.22½c.
C.i.f. Pacific ports.....	2.30c.

Structural Shapes

Base Per Lb.

F.o.b. Pittsburgh mills.....	1.85c. to 1.90c.
F.o.b. Chicago.....	1.95c. to 2.10c.
F.o.b. Birmingham.....	2.05c. to 2.15c.
F.o.b. Lackawanna.....	1.95c.
F.o.b. Bethlehem.....	2.00c.
Del'd Cleveland.....	2.04c. to 2.09c.
Del'd Philadelphia.....	2.12c. to 2.18c.
Del'd New York.....	2.14½c. to 2.19½c.
C.i.f. Pacific ports.....	2.35c.

Hot-Rolled Flats (Hoops, Bands and Strips)

Base Per Lb.

Narrower than 3 in., P'gh.....	2.20c. to 2.40c.
Wider than 3 in. to 6 in., P'gh.....	2.10c. to 2.20c.
6 in. and wider, P'gh.....	1.90c. to 2.00c.
Narrower than 3 in., Chicago.....	2.30c. to 2.50c.
From 3 to 6 in., Chicago.....	2.20c. to 2.30c.
6 in. and wider, Chicago.....	2.00c. to 2.10c.

*Mills follow plate or sheet prices according to gage on wider than 12 in.

Cold-Finished Steel

Base Per Lb.

Bars, f.o.b. Pittsburgh mills.....	2.20c. to 2.30c.
Bars, f.o.b. Chicago.....	2.20c. to 2.30c.
Bars, Cleveland.....	2.25c. to 2.35c.
Shafting, ground, f.o.b. mill.....	*2.45c. to 2.90c.
Strips, under 12 in., 1 up to 3 tons, P'gh.....	3.00c. to 3.15c.
Strips, under 12 in., 1 up to 3 tons, Cleveland.....	3.00c. to 3.15c.
Strips, under 12 in., 1 up to 3 tons, del'd Chicago.....	3.30c. to 3.45c.
Strips, under 12 in., 1 up to 3 tons, Worcester.....	3.25c. to 3.40c.

*According to size.

Wire Products

(To jobbers in car lots, f.o.b. Pittsburgh and Cleveland)

Base Per Keg

Wire nails.....	\$2.65
Galvanized nails.....	4.65
Galvanized staples.....	3.35
Polished staples.....	3.10
Cement coated nails.....	2.65

Base Per 100 Lb.

Bright plain wire, No. 9 gage.....	\$2.50
Annealed fence wire.....	2.65
Spring wire.....	3.50
Gal'd wire, No. 9.....	3.10
Barbed wire, gal'd.....	3.35
Barbed wire, painted.....	3.10
Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Birmingham mill prices \$3 a ton higher; Worcester, Mass., (wire) mill \$5 a ton higher on production of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.	

Woven Wire Fence

Base to Retailers Per Net Ton

F.o.b. Pittsburgh.....	\$65.00
F.o.b. Cleveland.....	65.00
F.o.b. Anderson, Ind.....	66.00
F.o.b. Chicago district mills.....	67.00
F.o.b. Duluth.....	68.00
F.o.b. Birmingham.....	68.00

Sheets

Blue Annealed

Base Per Lb.

Nos. 9 and 10, f.o.b. Pittsburgh.....	2.10c. to 2.20c.
Nos. 9 and 10, f.o.b. Chicago dist. mill.....	2.20c. to 2.30c.
Nos. 9 and 10, del'd Cleveland.....	2.29c.
Nos. 9 and 10, del'd Philadelphia.....	2.42c. to 2.52c.
Nos. 9 and 10, f.o.b. Birmingham.....	2.25c. to 2.30c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.90c.
No. 24, f.o.b. Chicago dist. mill.....	3.00c.
No. 24, del'd Cleveland.....	3.09c.
No. 24, del'd Philadelphia.....	3.22c.
No. 24, f.o.b. Birmingham.....	3.05c.

Metal Furniture Sheets

No. 24, f.o.b. Pittsburgh, A grade.....	4.05c.
No. 24, f.o.b. Pittsburgh, B grade.....	3.85c.

Galvanized

No. 24, f.o.b. Pittsburgh.....	3.65c. to 3.75c.
No. 24, f.o.b. Chicago dist. mill.....	3.85c.
No. 24, del'd Cleveland.....	3.84c. to 3.94c.
No. 24, del'd Philadelphia.....	4.07c.
No. 24, f.o.b. Birmingham.....	3.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	3.00c.
No. 28, f.o.b. Chicago dist. mill.....	3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.15c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill primes.....	4.10c.
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Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mills.....	\$5.25
Standard cokes, f.o.b. Gary and Elwood, Ind.....	5.35

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per package, 20 x 28 in.)

8-lb. coating I.C. \$11.20	25-lb. coating I.C. \$16.70
15-lb. coating I.C. 14.00	30-lb. coating I.C. 17.75
20-lb. coating I.C. 15.30	40-lb. coating I.C. 19.85

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago or Ohio Mill)

S. A. E. Series Numbers	Base Per 100 Lb.
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2100* (¼% Nickel, 0.10% to 0.20% Carbon)	\$2.90 to \$3.00
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2300 (3¼% Nickel)	4.00 to 4.10
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2500 (5% Nickel)	5.00 to 5.25
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3100 (Nickel Chromium)	3.00 to 3.10
------------------------	--------------

3200 (Nickel Chromium)	4.75 to 5.00
------------------------	--------------

3300 (Nickel Chromium)	6.75 to 7.00
------------------------	--------------

3400 (Nickel Chromium)	6.00 to 6.25
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5100 (Chromium Steel)	3.00 to 3.10
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5200* (Chromium Steel)	7.00 to 7.50
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6100 (Chrom. Vanadium bars)	4.00 to 4.15
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6100 (Chrom. Vanad. spring steel)	3.50 to 3.75
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9250 (Silicon Manganese spring steel)	3.00 to 3.15
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Carbon Vanadium (0.45% to 0.55% Carbon, 0.15% Vanad.)	4.10 to 4.20
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Nickel Chrom Vanadium (0.60 Nickel, 0.50 Chrom., 0.15 Vanad.)	4.05 to 4.20
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Chromium Molybdenum bars (0.80—1.10 Chrom., 0.25—0.40 Molyb.)	4.00 to 4.25
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Chromium Molybdenum bars (0.50—0.70 Chrom., 0.15—0.25 Molyb.)	3.05 to 3.10
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Chromium Molybdenum spring steel (1—1.25 Chrom., 0.30—0.50 Molybdenum)	4.50 to 4.75
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Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 in. down to and including 2½ in. squares, the price is \$5 a gross ton above the 4 x 4 billet price.

*Not S. A. E. specification, but numbered by manufacturers to conform to S. A. E. system.

Rails

Per Gross Ton

Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	36.00
Light (from rail steel), f.o.b. mill.....	34.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

Base Per 100 Lb.

Spikes, ½ in. and larger.....	\$2.70 to \$2.80
Spikes, ¼ in. and smaller.....	2.70 to 2.80
Spikes, boat and barge.....	2.90 to 3.00
Tie plates, steel.....	2.15
Angle, bars.....	2.75
Track bolts, to steam railroads.....	3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count, 70 per cent off list	

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Inches	Steel Black	Galv.	Inches	Iron Black	Galv.
½.....	45	19½	¼ to ¾.....	+11	+39
¾ to 1.....	51	25½	¾.....	22	2
1.....	56	42½	1.....	28	11
1½.....	60	48½	1 to 1½.....	30	13
1 to 3.....	62	50½			

Lap Weld

2.....	55	43½	2.....	23	7
2½ to 6.....	59	47½	2½.....	26	11
7 and 8.....	56	43½	3 to 6.....	28	13
9 and 10.....	54	41½	7 to 12.....	26	11
11 and 12.....	53	40½			

Butt Weld, extra strong, plain ends

¼.....	41	24½	¼ to ¾.....	+19	+54
¾ to 1.....	47	30½	¾.....	21	17
1.....	53	42½	1.....	28	12
1½.....	58	47½	1 to 1½.....	30	14
1 to 1½.....	60	49½			
2 to 3.....	61	50½			

Lap Weld, extra strong, plain ends

2.....	53	42½	2.....	23	9
2½ to 4.....	57	46½	2½ to 4.....	29	15
4½ to 6.....	56	45½	4½ to 6.....	28	14
7 to 8.....	52	39½	7 to 8.....	21	15
9 and 10.....	45	32½	9 to 12.....	16	2
11 and 12.....	44	31½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5 and 2½%, and on galvanized by 1½ points, with supplementary discount of 5 and 2½%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago, delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Lap Welded Steel	Charcoal Iron
2 to 2½ in.....	27
2½ to 3 in.....	37
3 in.....	40
3½ to 4 in.....	42½
4 to 13 in.....	46

Beyond the above discounts, 7 fives extra are given on lap welded steel tubes and 2 tens to 2 tens and 1 five on charcoal iron tubes.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.....	60	3 in.....	45
1½ to 1½ in.....	52	3½ to 3½ in.....	47
1½ in.....	36	4 in.....	50
2 to 2½ in.....	31	4½, 5 and 6 in.....	45
2½ to 2½ in.....	39		

Hot Rolled

2 and 2½ in.....	37	3½ and 3½ in.....	38
2½ and 2½ in.....	45	4 in.....	51
3 in.....	51	4½, 5 and 6 in.....	51

Less carloads, 4 points less. Add \$8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tubes list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List

Carbon, 0.10% to 0.30%, base.....	55
Carbon, 0.30% to 0.40%, base.....	50
Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

understood that the Texas Co. inquiries for re-export oil can sizes of tin plate have been divided between a Pittsburgh district and a Chicago district mill. The Nippon Oil Co. business is reported here to have been placed abroad. No other new business of account recently has come out.

Cold-Finished Steel Bars and Shafting.—Buyers are not yet showing much interest in second quarter tonnages, but in a few instances where there has been a desire for coverage for that period, makers have named 2.30c., base Pittsburgh. It appears that while a higher price may later be announced, contract buyers will likely be given an opportunity to cover at 2.30c. for the next quarter. Specifications against first quarter contracts are good, but hardly as large as they were recently, buyers evidently conserving some of their tonnage carrying 2.20c. for specification late this month for April shipment.

Hot-Rolled Flats.—There is some evidence that, as a result of heavy shipments over the past two months, buyers have built stocks up sufficiently to get along with somewhat lighter new shipments. Business still is good, but not quite as good as it was during the last half of February. Some makers who did not get filled up and who now can make very prompt shipments have done better in the past few weeks than they did previously. Advanced prices announced for second quarter are adhered to and a fair amount of contracting is reported.

Cold-Rolled Strips.—A slight recession in new specifications does not mean that the market is quiet in point of production or shipments, but rather that consumers have fairly good stocks and are trying to prolong low-priced tonnage as long as possible.

Bolts, Nuts and Rivets.—Leading makers of rivets have announced an advance of \$3 a ton on large rivets, effective immediately, and also applying on second quarter contracts. The new prices are \$2.90 per 100 lb., base Pittsburgh or Cleveland, and \$3, base Chicago or Birmingham. A few buyers who failed to contract for this quarter have been obliged to pay the advance, but the bulk of the movement still is at the first quarter contract prices, specifications having been somewhat stimulated by the advance. Bolt and nut business in February ran from 15 to 20 per cent above that for January, but the gain loses some of its significance in view of the fact that January business was not much in excess of 50 per cent of productive capacity.

Coke and Coal.—Spot offerings of furnace coke are ample and prices remain at the recent low levels. There are few blast furnaces using Connellsville coke that are not covered for the second quarter, and there

is less than the usual amount of open market inquiry for that period. Producers are naming \$3 per net ton at ovens as their idea on contract supplies for the period, but it is doubtful if any business now on producers' books carries more than \$2.75. Spot foundry coke takes a full range of from \$3.75 to \$5.10 in open-top cars, but most of the current business is at prices ranging from \$3.75 to \$4.25. The coal market is still very dull and shows no strength as the supply is still too great for wants. A Youngstown district steel company is reported to have contracted for 1,000,000 tons of lump gas coal for delivery over the year beginning April 1 at \$2 per net ton at mines. This plainly indicates the need of business by operators, since that price can hardly be profitable even on today's wage scales.

Old Material.—The market still is very quiet so far as consumer interest goes. Heavy melting steel cannot be had freely at \$14.50, but dealers are able to pick up small lots at that price and are not offering more than \$14.25 for delivery at one point in the district. Fairly large quantities are available at \$14.75 and dealers still are going up to \$15 to cover against sales to consumers with rather exacting specifications. As much as \$14.50 has been paid for compressed sheets, and on the present basis in Detroit they cannot be landed here under \$14.75. In Youngstown the market is \$14.50 and that district has a freight advantage over Pittsburgh on shipments from the West of about 60c. per ton. Machine shop turnings are weaker with sales at \$10.50 to \$11, the more recent sales being noted at the lower figure. Supplies are liberal as Youngstown is not taking much at present. Heavy breakable cast scrap is easier. The March list of the Norfolk & Western Railroad contains 8744 gross tons.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Furnace Grades:

Heavy melting steel.....	\$14.50 to \$15.00
Scrap rails	14.50
Compressed sheet steel.....	14.00 to 14.50
Bundled sheets, sides and ends...	13.00 to 13.50
Cast iron carwheels.....	14.50 to 15.00
Sheet bar crops, ordinary.....	15.00 to 15.50
Heavy breakable cast.....	13.00 to 13.50
No. 2 railroad wrought.....	15.00 to 15.50
Heavy steel axle turnings.....	13.00 to 13.50
Machine shop turnings.....	10.50 to 11.00

Acid Open-Hearth Furnace Grades:

Railroad knuckles and couplers..	16.75 to 17.25
Railroad coil and leaf springs...	16.75 to 17.25
Rolled steel wheels.....	16.75 to 17.25
Low phosphorus billet and bloom ends	18.50 to 19.00
Low phosphorus, mill plate.....	17.50 to 18.00
Low phosphorus, light grade.....	16.50 to 17.00
Low phosphorus sheet bar crops...	17.50 to 18.00
Heavy steel axle turnings.....	13.00 to 13.50

Electric Furnace Grades:

Low phosphorus punchings.....	16.50 to 17.00
Heavy steel axle turnings.....	13.00 to 13.50

Blast Furnace Grades:

Short shoveling steel turnings...	11.00
Short mixed borings and turnings	11.00
Cast iron borings.....	11.00
No. 2 busheling.....	10.00 to 10.25

Rolling Mill Grades:

Steel car axles.....	18.00 to 19.00
No. 1 railroad wrought.....	11.00 to 11.50
Sheet bar crops.....	17.00 to 17.50

Cupola Grades:

No. 1 cast.....	14.50 to 15.00
Rails 3 ft. and under.....	15.00 to 15.25

Malleable Grades:

Railroad	14.50 to 15.00
Industrial	14.00 to 14.50
Agricultural	13.50 to 14.00

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes.....	2.90c.
Reinforcing steel bars.....	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons.....	3.60c.
Squares and flats.....	4.10c.
Bands	3.60c.
Hoops	4.00c. to 4.50c.
Black sheets (No. 24 gage), 25 or more bundles	3.65c.
Galvanized sheets (No. 24 gage), 25 or more bundles	4.50c.
Blue annealed sheets (No. 10 gage), 25 or more sheets	3.10c.
Galvanized corrugated sheets (No. 28 gage), per square.....	\$4.39
Spikes, large	3.30c. to 3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 62½ per cent off list	
Machine bolts, per 100 count. 62½ per cent off list	
Carriage bolts, per 100 count. 62½ per cent off list	
Nuts, all styles, per 100 count, 62½ per cent off list	
Large rivets, base per 100 lb.....	\$3.50
Wire, black soft annealed, base per 100 lb.....	\$3.00 to 3.10
Wire, galvanized soft, base per 100 lb.....	3.00 to 3.10
Common wire nails, per keg.....	3.00
Cement coated nails, per keg.....	3.05

Production of bituminous coal in February is estimated by the United States Bureau of Mines at 41,290,000 net tons, or an average of 1,658,000 tons each working day. This is lower than in January, when production was 44,208,000 tons, or 1,747,000 tons a day.

Coal production of the United States in 1927 is estimated by the Bureau of Mines at 600,456,000 net tons, a drop of 9 per cent from the 657,804,437 tons of 1926. Of the total, 519,804,000 tons was bituminous and 80,652,000 tons anthracite.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

F.o.b. Pittsburgh or Youngstown

Billets and Blooms

	Per Gross Ton
Re-rolling, 4-in. and over.....	\$33.00
Re-rolling, under 4-in. to and in- cluding 1½ in.	\$33.50 to 34.00
Forging, ordinary	38.00 to 39.00
Forging, guaranteed	43.00 to 44.00

Sheet Bars

	Per Gross Ton
Open-hearth or Bessemer	\$34.00

Slabs

	Per Gross Ton
8 in. x 2 in. and larger.....	\$33.00
Smaller than 8 in. x 2 in.....	34.00

Skelp

	Per Lb.
Grooved	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.

Wire Rods

	Per Gross Ton
*Common soft, base.....	\$44.00
Screw stock	\$5.00 per ton over base

*Chicago mill base is \$45. Cleveland mill base, \$44.

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron.....	\$4.55
Old range non-Bessemer, 51.50% iron.....	4.40
Menabi Bessemer, 51.50% iron.....	4.40
Menabi non-Bessemer, 51.50% iron.....	4.25
High phosphorus, 51.50% iron.....	4.15
Foreign Ore, c.i.f. Philadelphia or Baltimore	Per Unit

Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria.....	10.00c.
Iron ore, Swedish, average 66% iron, 9.25c. to 9.50c.	

Manganese ore, washed, 52% manganese, from the Caucasus	39c.
Manganese ore, Brazilian, African or Indian, basis 50%	38c. to 39c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$10.25 to \$10.75

	Per Gross Ton
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
	Per Lb.
Molybdenum ore, 85% concentrates of MoS ₂ , delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.60 to \$2.75
Foundry, f.o.b. Connellsville prompt	3.75 to 4.50
Foundry, by-products, Ch'go ovens	9.00
Foundry, by-product, New England, del'd	11.50
Foundry, by-product, Newark or Jersey City, delivered.....	9.45 to 9.85
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis....	9.75

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.80
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in., f.o.b. Pa. mines.....	2.00 to 2.10
Mine run gas coal, f.o.b. Pa. mines	1.75 to 1.90
Steam slack, f.o.b. W. Pa. mines....	0.90 to 1.00
Gas slack, f.o.b. W. Pa. mines....	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, furnace or seab'd.....	\$100.00
Foreign, 80%, Atlantic or Gulf port, duty paid	100.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	\$31.00 to \$32.00
Domestic, 16 to 19%	29.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	\$33.50 to \$38.50
75%	130.00 to 140.00

	Per Gross Ton
10%	\$35.00
11%	37.00

Bessemer Ferrosilicon

	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
10%	\$30.00
11%	32.00

Silvery Iron

	Per Gross Ton
F.o.b. Jackson County, Ohio, Furnace	
6%	\$23.00
7%	24.00
8%	25.00
9%	26.00

Other Ferroalloys

Ferrotungsten, per lb. contained metal, del'd	92c. to 95c.
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltititanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads.....	\$200.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton.....	\$91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton.....	\$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines.....	\$15.00
No. 2 lump, Illinois and Kentucky mines.....	\$20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid....	\$16.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines.....	\$32.50

Fire Clay

	Per 1000 f.o.b. Works
First Quality	
Second Quality	
Pennsylvania ...	\$43.00 to \$46.00 \$35.00 to \$38.00
Maryland	43.00 to 46.00 35.00 to 38.00
New Jersey	50.00 to 65.00
Ohio	43.00 to 46.00 35.00 to 38.00
Kentucky	43.00 to 46.00 35.00 to 38.00
Missouri	43.00 to 46.00 35.00 to 38.00
Illinois	43.00 to 46.00 35.00 to 38.00
Ground fire clay, per ton	7.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	\$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton.....	\$3.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

	Per 100 Pieces
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads.....	70
Hot-pressed nuts, blank or tapped, square....	70
Hot-pressed nuts, blank or tapped, hexagons....	70
C.d.c. and t. square or hex. nuts, blank or tapped	70
Washers*	6.75c. to 6.50c. per lb. off list

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts.....	70
Semi-finished hexagon castellated nuts, S.A.E. 70	
Stove bolts in packages, Pittsburgh 80, 10 and 2½	
Stove bolts in packages, Chicago 75, 20, 10 and 5	
Stove bolts in bulk, Pittsburgh.....	80, 10 and 5
Stove bolts in bulk, Chicago.....	75, 20, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55 to 60 per cent apply.

Large Rivets

	Base per 100 Lb.
(½-In. and Larger)	
F.o.b. Pittsburgh or Cleveland.....	\$2.90
F.o.b. Chicago	3.00

Small Rivets

	Per Cent Off List
(¾-In. and Smaller)	
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10 to 70

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 10
Milled standard set screws, case hardened, 80 and 10	
Milled headless set screws, cut thread.....	80 and 10
Upset hex. head cap screws, U.S.S. thread, 85 and 5	
Upset hex. cap screws, S.A.E. thread.....	85 and 5
Upset set screws	80, 10 and 10
Milled studs	70 and 5

Chicago

Steel Ordering Continues at High Rate —Ingot Output 95 Per Cent

CHICAGO, March 6.—Recent advances in prices have served to drive in specifications, the total of which was the fourth largest of any week in the past two years. New sales, checked momentarily by the announcement of higher quotations, now show marked improvement, making the week one of the best in many months. Ingot output is holding steady at 95 per cent of capacity and at that rate is lagging behind both new business and shipping orders.

Farm implement manufacturers exert a steady pressure for steel deliveries and automobile production schedules picture a gradually expanding activity in that industry. Railroad equipment orders are not heavy but fresh inquiry is in sight from the Rock Island. It is reported that the board of directors of that railroad will meet this week and that consideration will be given to the purchase of 2000 freight cars. Structural awards continue in good volume and shops are entering the spring period with order books of good size. A 4500-ton and a 3000-ton order in Chicago and one for 2500 tons from Ottawa, Ill., head the list. The Agricultural Mart, a project that has shown no life for many months, now gives promise of being revived and the first unit may require 16,000 tons.

Of special interest is the fact that a Western railroad has ordered 13,000 tons of rails in addition to the tonnage placed last fall for spring delivery. Competition from producers south of Chicago has resulted in shading of \$1 to \$1.50 a net ton on steel tie plates.

Pig Iron.—Second quarter contracting is progressing steadily and sales are close in volume to the last week in February. Most of the larger buyers have covered and individual purchases now are smaller than in the first part of the move to cover for the next three months. While there is no general inclination to buy for the third quarter, some inquiry for that period is before the trade and several lots have been purchased. Northern foundry iron is steady at \$18.50 a gross ton and full differentials are being obtained. Sale of 1000 tons of Southern iron is reported.

<i>Prices per gross ton at Chicago:</i>	
Northern No. 2 foundry, sil. 1.75 to 2.25	\$18.50
N't'n No. 1 fdy., sil. 2.25 to 2.75	19.00
Malleable, not over 2.25 sil.	18.50
High phosphorus	18.50
Lake Superior charcoal, averaging sil. 1.50	27.04
Southern No. 2 fdy. (all rail) ...	22.01
Southern No. 2 (barge and rail) ..	21.18
Low phos., sil. 1 to 2 per cent, copper free	\$28.50 to 29.00
Silvery, sil. 8 per cent.	29.79
Bessemer ferrosilicon, 14 to 15 per cent	46.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—In new sales this market is quiet but contract buyers are taking large shipments. A carload of 19 to 21 per cent spiegeleisen brought \$32, Hazard, Pa. Quotations for ferromanganese are unchanged at \$100, seaboard.

Prices delivered Chicago: 80 per cent ferromanganese, \$107.56; 50 per cent ferrosilicon, \$83.50 to \$87.50; spiegeleisen, 19 to 21 per cent, \$38.76 to \$39.76.

Plates.—Three oil producers in Texas have ordered a total of 12,000 tons of plates for storage tank construction. These orders practically wipe out inquiry that was before the trade, but there is evidence that additional tonnages are soon to come into the market. Railroad equipment is moderately active with orders for 700 cars. Wilson & Co. have placed 300 refrigerator cars with the Bettendorf Co. and the Soo Line has contracted for 400 box cars. Specifications from car shops are substantial in size and are so arranged that mills with good-sized order books are still meeting delivery demands in a satisfactory manner.

Quotations on spot and future business are steady at 2c., Chicago, for 100 tons or more and at 2.10c. for smaller lots.

Mill prices on plates per lb.: 1.95c., base Chicago.

Shapes.—Structural awards in this district total 6000 tons in the week and fresh inquiry is for not less than 7000 tons. The Steuben Club Building, Chicago, which calls for 4500 tons, has been taken by the Gage Structural Steel Co., and the Union Carbide & Carbon Building, 3000 tons, by the American Bridge Co. Notable among fresh projects are 3000 tons for two buildings at Minneapolis, 1000 tons for the county's portion of the safety building at Milwaukee and a sizable tonnage for two steel frame high school buildings in Chicago. Although lettings in the last month have been large, shop operations are not well balanced and competition holds fabricated steel prices low regardless of the tonnage involved. Mill quotations on structural material are steady at 2c. to 2.10c., Chicago, depending on the tonnage. Most of the current shipments are being made against contracts placed at lower prices.

Mill prices on plain material per lb.: 1.95c. to 2.10c., base, Chicago.

Bars.—Specifications for soft steel bars are unusually heavy. The automobile trade is the largest user, with farm implement manufacturers a good second. It is now reported that the Chevrolet Motor Co. has revised its schedule for March and will produce 135,000 cars or 8000 more than were called for in the previous schedule. The iron bar market is quiet and without feature. Local alloy bar mills are heavily engaged and specifications are in excess of output. Increased service demanded by buyers of tractors is causing a rapidly expanding call for alloy steel bars for use in that class of machinery. Business in hard steel bars continues brisk and order books are well balanced and of good size for bars to be delivered over the next six weeks or two months. Second quarter contracting at 1.85c., Chicago Heights mills, is proceeding slowly. Specifications are about equal to shipments.

Mill prices per lb.: Soft steel bars, 1.95c. to 2.10c., base, Chicago; common bar iron, 2.00c., base, Chicago; rail steel bars, 1.80c. to 1.85c., base, Chicago Heights mill.

Wire Products.—Demand for these commodities is shifting both as to commodity and classes of users. Rural sections are taking smaller tonnages of nails and there is a slight decline in orders from jobbers in the North Central States. Business in the South is steady, while both orders and specifications from the manufacturing trade are heavier. The net result is that shipments are about equal to mill output, which stands at 75 per cent of capacity.

Sheets.—Chicago district mills are heavily engaged and deliveries range from four to six weeks, depending on the grade desired. Reports of price advances are still heard but in the meantime producers are busily engaged taking in tonnages for delivery during the second quarter at prices that are unchanged. Demand is widespread and comes from practically all classes of users. Barrel manufacturers have speeded production and farm implement makers continue to issue heavy specifications.

Base prices per lb., delivered from mill in Chicago: No. 24 black, 3.05c.; No. 24 galvanized, 3.90c.; No. 10 blue annealed, 2.25c. to 2.35c. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Reinforcing Bars.—Return of moderate weather has added life to this market and during the week over 2000 tons of billet steel reinforcing bars and 700 tons of the rail steel bar commodity have been awarded to bending shops. The largest single contract was 1600 tons for a cold storage warehouse and 400 tons will be used in the Chicago Civic Opera Building. Fresh inquiry is promising and many new projects are now in the hands of estimators. Prices for billet steel reinforcing bars are moderately steady at 2.35c. to 2.75c., Chicago warehouses. Evidence of weakness is at hand on quotations for attractive tonnages. Hard steel reinforcing bars are quotable at 1.85c. to 1.95c., the higher price applying on bridge and culvert work.

Hot-Rolled Strip.—Production of this commodity is

at capacity. Second quarter books are open at current quotations and forward buying is of fair proportions.

Billets.—The \$1 a ton advance in billets announced a week ago by Chicago producers has been well tested by both spot and future orders. Rerolling billets, 4 in. and over, are being quoted at \$34 a gross ton.

Sheet Bars.—New sales in this commodity have established prices at \$35 per gross ton. Production is at capacity and specifications for the week are heavier than in any like period in the last year and a half.

Cold-Rolled Strip.—Second quarter books for cold-rolled strip are open at 3.15c., Cleveland, or 3.45c., delivered Chicago, in widths less than 12 in. and in lots of 1 to 3 tons. Forward buying is moderately active and specifications are heavy. Output is at close to plant capacity. Shipments in February this year were fully 29 per cent heavier than in the second month of last year.

Rails and Track Supplies.—Prices for steel tie plates are weak at \$2.15, base, per 100 lb.. Quotations on other track accessories are steady. Of particular interest in the rail market is the purchase of 13,000 tons of standard-section rails by a Western railroad. This is the first order to be placed in what is referred to as the secondary buying movement. For several weeks past local rail mills have been engaged at 90 to 95 per cent of capacity and it is variously estimated that not more than 30 per cent of the rails purchased in the fall buying movement have been rolled. Shipping schedules are well arranged and they indicate a sustained rate of output up to June 1 or even beyond. Miscellaneous orders for track fastenings total 5000 tons and fresh inquiry is of fair size and active. The light rail market is dull.

Bolts, Nuts and Rivets.—New discounts on stove bolts are 75, 20, 10 and 5 off list in package lots and an additional 2½ per cent off list in bulk. Small rivets are steady at 70 and 10 to 70 per cent off list. Producers have named \$3, Chicago, as the second quarter contract price for large rivets. Specifications have not held the gain made a week ago.

Prices f.o.b. mill, per gross ton: Standard-section open-hearth and Bessemer rails, \$43; light rails, rolled from billets, \$36. *Per Lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.25c.; angle bars, 2.75c.

Coke.—Prices for by-product foundry coke are steady at \$9, local ovens, and at \$9.50, delivered in the Chicago switching district. Shipments have made a slight gain over a week ago. It is reported that sellers of foundry coke in Indiana have named lower prices for spot and future delivery.

Cast Iron Pipe.—Keen competition among producers has again weakened quotations on large tonnages of cast iron pipe. The United States Cast Iron Pipe & Foundry Co. has taken 1600 tons of 8 and 12-in. pipe for Chicago at \$26.70, Birmingham, or \$34.90, delivered. One competitive price was near these figures, while other bids were close to \$30, Birmingham. At Rockford, Ill., the same seller took 500 tons at \$36.97, delivered, or \$28.77, Birmingham. A number of private

lettings in the week were awarded at prices that ranged close to \$30, Birmingham. Cast iron pipe is quotable in this market at \$35.20 to \$38.20, delivered, for 6-in. and larger diameters. Canton, Ohio, has closed for 300 tons of 6, 8 and 12-in. pipe. Noteworthy among fresh inquiries is 1040 tons of 4 to 12-in. class B pipe for Barberton, Ohio. This market is moderately active. Three contractors have placed large orders in the week and public utilities are actively engaged in buying against early spring requirements. Little interest in cast iron pipe is being shown by the railroads.

Prices per net ton, delivered Chicago: Water pipe, 6-in. and over, \$35.20 to \$38.20; 4-in., \$39.20 to \$42.20; Class A and gas pipe, \$4 extra.

Old Material.—The Chicago scrap market shows a mixed situation. Several large users of heavy melting steel have been getting shipments faster than they could be handled and hold-up orders have been the result. Railroad shipments are large and steady. Distress tonnages are giving more trouble than in many months. Cast iron borings, which formerly were diverted to the Mayville, Wis., furnace when it was in operation, are now reaching the Chicago market and making a bad situation worse. Evidence of speculation is at hand in prices being obtained by the railroads. On such grades as railroad malleable, rerolling rails, short rails and heavy melting steel the Illinois Central got higher than the top of present published quotations. The Santa Fe is advertising a list of 5000 tons.

Prices delivered consumers' yards, Chicago:
Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$12.75 to \$13.25
Shoveling steel	12.75 to 13.25
Frogs, switches and guards, cut apart, and miscellaneous rails.....	14.25 to 14.75
Hydraulic compressed sheets....	11.25 to 11.75
Drop forge flashings.....	9.75 to 10.25
Forged, cast and rolled steel car-wheels	15.25 to 15.75
Railroad tires, charging box size.....	16.50 to 17.00
Railroad leaf springs, cut apart..	16.50 to 17.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles.....	14.50 to 15.00
Coil springs	16.50 to 17.00
Electric Furnace Grades:	
Axle turnings	13.00 to 13.50
Low phosphorus punchings.....	14.25 to 14.75
Low phosphorus plate, 12 in. and under	13.50 to 14.00
Blast Furnace Grades:	
Axle turnings	10.75 to 11.25
Cast iron borings	9.75 to 10.25
Short shoveling turnings.....	9.75 to 10.25
Machine shop turnings.....	7.25 to 7.75
Rolling Mill Grades:	
Iron rails	13.50 to 14.00
Rerolling rails	15.00 to 15.50
Cupola Grades:	
Steel rails less than 3 ft.....	15.50 to 16.00
Angle bars, steel.....	14.25 to 14.75
Cast iron carwheels.....	14.00 to 14.50
Malleable Grades:	
Railroad	13.00 to 13.50
Agricultural	12.50 to 13.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.....	23.00 to 25.00
*Relaying rails, 65 lb. and heavier.	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:	
Iron angle and splice bars.....	14.00 to 14.50
Iron arch bars and transoms....	18.75 to 19.25
Iron car axles.....	21.50 to 22.00
Steel car axles.....	16.00 to 16.50
No. 1 railroad wrought.....	11.00 to 11.50
No. 2 railroad wrought.....	11.25 to 11.75
No. 1 bushelling.....	9.25 to 9.75
No. 2 bushelling.....	4.25 to 4.75
Locomotive tires, smooth.....	12.50 to 13.00
Pipes and flues.....	8.00 to 8.50
Cupola Grades:	
No. 1 machinery cast.....	14.50 to 15.00
No. 1 railroad cast.....	13.00 to 13.50
No. 1 agricultural cast.....	13.00 to 13.50
Stove plate	11.25 to 11.75
Grate bars	11.50 to 12.00
Brake shoes	11.50 to 12.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforcing bars, billet steel.....	2.35c. to 2.75c.
Cold-finished steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Bands	3.65c.
Hoops	4.15c.
Black sheets (No. 24).....	3.95c.
Galvanized sheets (No. 24).....	4.80c.
Blue annealed sheets (No. 10).....	3.50c.
Spikes, standard railroad.....	3.55c.
Track bolts	4.55c.
Rivets, structural	3.60c.
Rivets, boiler	3.60c.
	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws.....	60
Hot-pressed nuts, squares, tapped or blank..	60
Hot-pressed nuts, hexagons, tapped or blank.	60
No. 8 black annealed wire, per 100 lb.....	\$3.20
Common wire nails, base per keg.....	3.00
Cement coated nails, base per keg.....	2.90

The American Rolling Mill Co. has purchased two slab-heating furnaces, a holding furnace and a continuous rough-plate heating furnace from the Flinn & Dreflein Co., Chicago. This equipment will be installed at the company's East Side works at Middletown, Ohio, where extensive improvements are being made.

Philadelphia

Steel Contracts for Second Quarter Made at 1.85c. Pittsburgh

PHILADELPHIA, March 6.—Although plates, shapes and bars have been advanced to 1.90c. per lb., base Pittsburgh, contracts are being made for second quarter at 1.85c. per lb., Pittsburgh, for bars, 2c., Coatesville, for plates and at 2c., Bethlehem, for shapes. There is still expectation of a further advance about April 1, but with most consumers covered, the value of such an increase is beginning to be doubted. A producer of shapes in eastern Pennsylvania is quoting on the basis of current contracts, which are at 1.80c. per lb., Pittsburgh, or 2.12c. per lb., delivered Philadelphia. Sheet prices are developing a stronger tendency, particularly blue annealed and galvanized. Black sheets are still obtainable at small concessions from the nominal market price of 2.90c. per lb., Pittsburgh.

There is some pig iron inquiry for second quarter, but many consumers are apparently inclined to delay action pending further developments in the situation on Buffalo barge shipments, which they believe may result in more competition and a recession from the present price level. A small basic tonnage has been closed at about \$20 per ton, delivered.

Pig Iron.—In the local market, eastern Pennsylvania furnaces are still quoting foundry iron at \$20 per ton, base, and offers of lower prices by consumers have brought no concessions acceptable to the buyer. The probability of a decided increase in barge and barge and rail shipments of iron from Buffalo into eastern Pennsylvania is viewed with some concern, but producers here are inclined to doubt some of the extremely low barge rates reported. Nevertheless, even at the regular rates for barge shipment from Buffalo, a highly competitive situation might develop. A Gloucester, N. J., consumer has bought 2000 tons of foundry iron, part foreign and part domestic, at slightly under published prices. A purchase of 6000 to 7000 tons of basic iron has been made by an eastern Pennsylvania consumer at a delivered price about \$20 per ton. Low phosphorus iron is quiet, but prices are firm.

Prices per gross ton at Philadelphia:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	\$20.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.26
East. Pa. No. 1X	21.76
Basic (delivered eastern Pa.)	\$19.50 to 20.00
Gray forge	19.75 to 20.25
Malleable	21.00 to 21.50
Standard low phos. (f.o.b. New York State furnace)	23.00 to 24.00
Copper bearing low phos. (f.o.b. furnace)	23.50 to 24.00
Virginia No. 2 plain, 1.75 to 2.25 sil.	24.54 to 25.04
Virginia No. 2X, 2.25 to 2.75 sil.	25.04 to 25.54

Prices, except as specified otherwise, are delivered Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, 1/4-in. and heavier	2.50c. to 2.60c.
Plates, 1/8-in.	2.80c. to 3.00c.
Structural shapes	2.40c. to 2.60c.
Soft steel bars, small shapes and iron bars (except bands)	2.50c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1 1/2 x 1 1/2 in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforcing steel bars, square, twisted and deformed	2.50c. to 3.00c.
Cold-finished steel, rounds and hexagons	3.35c.
Cold-finished steel, squares and flats	3.85c.
Steel hoops	3.60c.
Steel bands, No. 12 gage to 1/4-in., inclusive	3.35c.
Spring steel	5.00c.
Black sheets (No. 24)	4.25c.
Galvanized sheets (No. 24)	5.10c.
Blue annealed sheets (No. 10)	3.15c.
Diamond pattern floor plates—1/4-in.	5.30c.
1/8-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

Billets.—Despite advances in prices of plates, shapes and bars, rerolling billets continue at \$33 per ton, base Pittsburgh, and forging grade at \$38 per ton, Pittsburgh. A slight increase in small orders is reported.

Plates.—Quotations on small current purchases are 2.05c. per lb., Coatesville, or 2.15c. per lb., delivered Philadelphia, but contracts for second quarter are being made at 2c. per lb., Coatesville, or 2.10c. per lb., Philadelphia. Eastern Pennsylvania producers of plates are fairly busy and in one instance a mill has exhausted its reserve supply of ingots and now has additional open-hearth capacity in operation. The Reading Co. is inquiring for six car floats requiring about 200 tons of plates.

Shapes.—Current demand is small, but on small orders for prompt shipment 2.05c. per lb., Bethlehem, or 2.18c. per lb., Philadelphia, is being maintained with the exception of one eastern Pennsylvania mill, which is still quoting the current contract price of 1.80c. per lb., Pittsburgh, or 2.12c. per lb., Philadelphia. Specifications against first quarter contracts are slightly better than during February, but consumers are still delaying in asking for shipments. Six car floats for the Reading Co. will require 500 to 600 tons of shapes. Building permits issued in Philadelphia in January and February exceeded the first two months of 1927 and there is some sizable bridge construction in prospect for the present month.

Bars.—Specifications against contracts are coming out more freely than last month, but the market is rather inactive, particularly on current purchases for prompt shipment. On new business for immediate delivery, mills are quoting 1.90c. per lb., Pittsburgh, or 2.24c. per lb., Philadelphia. On contracts for second quarter 1.85c. per lb., Pittsburgh, or 2.17c. per lb., Philadelphia, are the prevailing quotations.

Sheets.—More firmness is evident in sheet prices. No concessions from 2.10c. per lb., base Pittsburgh, on blue annealed have been reported recently and galvanized sheets are fairly stable at 3.75c. per lb., Pittsburgh, with only small concessions obtainable. Black sheets are still off from the nominal basis of 2.90c. per lb., Pittsburgh. In line with the evident strengthening of sheets there is more interest among consumers in contracts for the next quarter, although very few such contracts have been closed.

Old Material.—The scrap market continues to show slight weakness in some grades. No. 1 heavy melting steel is going forward to consumers on \$13.50 and \$14 contracts, but no new purchases are reported. A Phoenixville, Pa., consumer has purchased a tonnage of stove plate at \$12.50 per ton and is now offering to buy at \$12, delivered. This mill is also offering to buy machine shop turnings at \$10.50 per ton, delivered, but has not yet succeeded in closing at this price. A tonnage of forge fire has been purchased at \$11 per ton, delivered Coatesville, Pa.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$13.50 to \$14.00
Scrap T rails	13.00 to 13.50
No. 2 heavy melting steel	11.00 to 11.50
No. 1 railroad wrought	15.00 to 15.50
Bundled sheets (for steel works)	10.50 to 11.00
Machine shop turnings (for steel works)	11.00
Heavy axle turnings (or equivalent)	12.00 to 12.50
Cast boring (for steel works and rolling mill)	11.00
Heavy breakable cast (for steel works)	15.50 to 16.00
Railroad grate bars	12.50
Stove plate (for steel works)	12.50
No. 1 low phos., heavy, 0.04 per cent and under	18.00 to 18.50
Couplers and knuckles	16.00 to 16.50
Roller steel wheels	15.50 to 16.00
No. 1 blast furnace scrap	10.50 to 11.00
Machine shop turnings (for rolling mill)	11.00
Wrought iron and soft steel pipes and tubes (new specifications)	12.50 to 13.00
Shafting	17.50 to 18.00
Steel axles	19.00 to 20.00
No. 1 forge fire	11.00 to 12.00
Steel rails for rolling	15.00 to 15.50
Cast iron carwheels	15.50 to 16.50
No. 1 cast	16.00 to 16.50
Cast borings (for chemical plant)	14.50 to 15.00

Warehouse Business.—Jobbers report a moderate volume of purchasing. Effective March 2, warehouses in this district have advanced steel bars, hoops and

bands \$2 per ton. Bars are now quoted at 2.50c. per lb., hoops at 3.60c. per lb. and bands at 3.35c. per lb., base.

Imports.—In the week ended March 3, no pig iron ore arrived at Philadelphia. A total of 310 tons of structural shapes arrived from Belgium and 26 tons from France, 57 tons of steel bars from Belgium and 35 tons from Germany, 72 tons of bands and strip steel from Belgium and 21 tons from the United Kingdom, 20 tons of reinforcing bars from Belgium and 34 tons of steel scrap from Germany.

New York

Steel Contracting for Second Quarter at Former Prices—Pig Iron Active

NEW YORK, March 6.—Sustained interest in pig iron is reflected by the sales of local brokers for the week, which totaled close to 10,000 tons. While most of the larger buyers have covered for their second quarter needs, considerable business continues to be placed by small melters. Pig iron consumption in this district is holding its own, but shows few indications of increasing. Meanwhile, with the season of navigation approaching, competition among furnaces is growing keener. On 2100 tons of foundry for the Gloucester, N. J., plant of the American Radiator Co., eastern Pennsylvania producers refused to shade their price of \$20, base furnace. The iron was bought at lower prices, however, being divided between foreign and outside domestic furnaces. Delivery will be by water. The Crane Co., Bridgeport, Conn., has bought 1500 tons of domestic iron for barge delivery. Buffalo foundry iron continues to be quoted at \$16.50, base furnace. Indian iron has been sold at \$19.75 to \$20.25, duty paid, port of entry.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	\$21.41 to \$21.91
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	20.39 to 22.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	20.89 to 23.02
East. Pa. No. 1X fdy., sil. 2.75 to 3.25	21.39 to 23.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

Reinforcing Bars.—Bids were taken this week on the anchorage and abutment towers for the Hudson River bridge, New York, involving approximately 500 tons of bars. Not all distributors in this territory have advanced their mill price to 2c., Pittsburgh, and 1.95c. is still the ruling price on any considerable tonnage. The Youngstown warehouse price is unchanged at 2.20c., or 2.57½c. on cars at New York, and out of New York warehouse the general quotations are 2.80c. for lots of 5 tons or more, 2.95c. for lots of 2 to 5 tons and 3.24c. for less than 2 tons, all delivered at job.

Finished Steel.—Steel business, as represented by new orders and specifications against first quarter contracts, continues at a good rate in this district. The common report from most of the steel companies' offices is that orders and shipments about balance, but contract specifications form a large proportion of mill rollings for the reason that nearly all buyers are protected through the quarter. It is now two weeks since the Carnegie Steel Co. announced an advance to 1.90c., Pittsburgh, on plates, shapes and bars, and within that time nearly all other steel companies have taken like action, but the \$1 advance has not become firmly established even as a second quarter contract price because of the wide coverage mills have given buyers for second quarter at 1.85c., Pittsburgh, or at corresponding levels at Eastern basing points. Eastern plate mills have made contracts for second quarter on the basis of 2c., Coatesville, and Eastern shape mills have contracted at 2c., Bethlehem. Moreover, additional tonnage for shipment this month has been taken from contract customers at the prices existing before the Feb. 21 advance. In sheets there has been very little second quarter contracting, but current shipments on contract remain at a high level. Structural steel contracts closed in New York within the last week totaled more than

14,000 tons, of which 5200 tons was for a loft building. Specifications for the Kill van Kull bridge, taking 15,000 tons, will be issued by the Port Authority on May 5.

Warehouse Business.—Since the first of the month there has been a slight increase in the volume of orders for material from stock and individual purchases are generally larger than for some time. Demand for structural material is good and there is a moderate tonnage of sheet buying. Prices are unchanged.

Mill prices per lb., delivered New York: Soft steel bars, 2.19c. to 2.24c.; plates, 2.17½c. to 2.22½c.; structural shapes, 2.14½c. to 2.19½c.; bar iron, 2.14c.

Cast Iron Pipe.—Although most makers are fairly well booked with enough tonnage of bell and spigot pipe to carry them for the next month to six weeks,

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.34c.
Soft steel bars and small shapes	3.24c.
Iron bars	3.24c.
Iron bars, Swedish charcoal	7.00c. to 7.25c.
Cold-finished shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-rolled strip, soft and quarter hard,	5.15c. to 5.40c.
Hoops	4.49c.
Bands	3.99c.
Blue annealed sheets (No. 10 gage)	3.84c. to 3.89c.
Long terme sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galvanized annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases	4.50c. to 7.00c.
Machine bolts, cut thread: Per Cent Off List	
¾ x 6 in. and smaller	.55 to 60
1 x 30 in. and smaller	.50 to 50 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller	.55 to 60
¾ x 20 in. and smaller	.50 to 50 and 10
Coach screws:	
½ x 6 in. and smaller	.55 to 60
1 x 16 in. and smaller	.50 to 50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded steel, 2-in.	\$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2 in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt	46	29
¾-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
½-in. butt	5	+19
¾-in. butt	11	+9
1-1½-in. butt	14	+6
2-in. lap	5	+14
3-6-in. lap	11	+6
7-12-in. lap	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box	\$6.45	\$6.20
Charcoal, per box—	A	AAA
IC	\$9.70	\$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating	\$10.00 to \$11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	3.80c. to 4.00c.
No. 22	3.95c. to 4.15c.
No. 24	4.00c. to 4.20c.
No. 26	4.10c. to 4.30c.
No. 28*	4.25c. to 4.45c.
No. 30	4.50c. to 4.70c.

Sheets, Galvanized

	Per Lb.
No. 14	4.35c.
No. 16	4.45c.
No. 18	4.35c. to 4.60c.
No. 20	4.50c. to 4.75c.
No. 22	4.55c. to 4.80c.
No. 24	4.70c. to 4.95c.
No. 26	4.95c. to 5.20c.
No. 28*	5.20c. to 5.45c.
No. 30	5.60c. to 5.85c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

low prices continue to appear on desirable business. With Northern makers quoting low delivered prices, Southern producers who have a \$9.25 per ton freight rate to pay are not offering much competition at present. Foundries have a fair total of business in small-size pipe, but are seeking tonnage in the larger diameters. The Long Island Lighting Co. is inquiring for about 600 tons of 20-in. pipe for Hempstead. The Department of Purchase, New York, is inquiring for about 3000 tons of cast iron pipe. Except for New York, no municipal buying of consequence has appeared in this district. Private purchasing continues fairly active.

Prices per net ton, delivered New York: Water pipe 6-in. and larger, \$37.25 to \$38.25; 4-in. and 5-in., \$42.25 to \$43.25; 3-in., \$52.25 to \$53.25; Class A and gas pipe, \$4 to \$5 extra.

Coke.—Purchasing of both furnace and foundry grades of coke is mostly in carload lots. Standard furnace coke ranges from \$2.75 to \$2.85 per ton, Connellsville, and standard foundry is quoted at about \$4 per ton, Connellsville, with special brands bringing up to \$5.10 per ton. Delivered prices of Connellsville foundry coke are: To northern New Jersey, \$8.03 to \$8.53; to New York or Brooklyn, \$8.79 to \$9.29; to Newark or Jersey City, \$7.91 to \$8.41. By-product prices are unchanged at \$9 to \$9.40 per net ton, delivered Newark or Jersey City.

Old Material.—No. 1 heavy melting steel is unchanged with brokers still buying at \$13.50 per ton, delivered eastern Pennsylvania. Some other grades, however, show a tendency to weakness. On the basis of recent sales of stove plate at \$12.50, brokers are offering \$12 per ton, delivered Phoenixville, Pa. Machine shop turnings are being purchased at \$10.50 per ton, delivered, but a consumer of turnings is refusing to pay more than \$10.50 per ton on further contracts. A broker who has been paying \$11 per ton, delivered eastern Pennsylvania, for yard grade of heavy melting steel is offering \$10.75 per ton. The scrap list of the Pennsylvania Railroad opening this week offers 40,000 to 50,000 tons. As a result of recent meetings of dealers and brokers in New York and Philadelphia, a committee has been appointed to form an Eastern Scrap Iron Association.

Dealers' buying prices per gross ton f.o.b. New York:

No. 1 heavy melting steel	.....	\$10.00 to \$10.85
Heavy melting steel (yard)	.....	7.00 to 7.25
No. 1 heavy breakable cast	.....	11.25 to 12.00
Stove plate (steel works)	.....	8.50 to 9.00
Locomotive grate bars	.....	8.75 to 9.00
Machine shop turnings	.....	6.75 to 7.50
Short shoveling turnings	.....	7.00 to 7.50
Cast borings (blast furnace or steel works)	.....	6.75 to 7.50
Mixed borings and turnings	.....	7.00 to 7.50
Steel car axles	.....	16.00 to 16.50
Iron car axles	.....	23.75 to 24.75
Iron and steel pipe (1 in. dia., not under 2 ft. long)	.....	8.75
Forge fire	.....	6.75 to 7.00
No. 1 railroad wrought	.....	10.50 to 11.00
No. 1 yard wrought, long	.....	9.00 to 9.50
Rails for rolling	.....	10.50 to 11.00
Cast iron carwheels	.....	11.25 to 11.75
Stove plate (foundry)	.....	8.50 to 9.00
Malleable cast (railroad)	.....	10.00 to 10.50
Cast borings (chemical)	.....	11.00 to 11.50

Prices per gross ton, delivered local foundries:

No. 1 machinery cast	.....	\$13.75 to \$14.25
No. 1 heavy cast (columns, building materials, etc.), cupola size	.....	11.75 to 12.25
No. 2 cast (radiators, cast boilers, etc.)	.....	11.25 to 11.75

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and structural shapes	..... 3.00c.
Soft steel bars	..... 3.00c.
Reinforcing steel bars	..... 2.25c. to 2.75c.
Cold-finished rounds and hexagons	..... 3.65c.
Cold-finished flats and squares	..... 4.15c.
Hoops and bands	..... 3.65c.
Cold-finished strip	..... *5.95c.
Black sheets (No. 24)	..... 3.75c.
Galvanized sheets (No. 24)	..... 4.40c. to 4.60c.
Blue annealed sheets (No. 10)	..... 3.25c.
No. 9 annealed wire, per 100 lb.	..... \$2.90
No. 9 galvanized wire, per 100 lb.	..... 3.35
Common wire nails, base per keg	..... 2.90

*Net base, including boxing and cutting to length.

Cleveland

New Price of 1.90c. for Plates, Shapes and Bars Not Established

CLEVELAND, March 6.—Efforts to establish 1.90c., Pittsburgh, as the price on steel bars, plates and structural material for current orders and the second quarter have not been wholly successful. Some of the outside mills made contracts at 1.85c. before the advance and other buyers in some cases have insisted on getting the same price from their regular sources of supply. As a result there is at present a price range of from 1.85c. to 1.90c., Pittsburgh, for both current orders and contracts. A few contracts have been taken at the higher price. A local mill is quoting steel bars at 1.90c., Cleveland. Specifications against 1.80c. contracts are fairly heavy.

Orders for steel are more numerous than recently, but the average size is smaller. Some of the mills declare that they will not accept large specifications on first quarter contracts at the end of the month, but it is expected that considerable steel will be ordered against the expiring contracts, deliveries on which will extend well into April. Consumers as a rule are not yet showing a great deal of interest in second quarter contracts.

The automotive industry continues to take sheets, strip steel and steel bars in good volume. Some of the motor car builders have placed second quarter contracts and several inquiries for that delivery are pending from this source. However, there seems to be a disposition in that industry to limit purchases to April requirements. A lull has developed in structural activity in this territory and local contractors are reaching out into other districts for business. A good amount of highway bridge work is in prospect in Ohio, western New York and Pennsylvania. Present prices on wire products and wire rods have been reestablished for the second quarter.

Pig Iron.—Sales have been rather moderate in the northern Ohio, Michigan and Indiana territories the past week, but the Eastern market has continued active and this has kept up the total sales. Cleveland interests during the week sold 31,000 tons in foundry and malleable iron, a large share of which was for shipment from Buffalo. No change has developed in the price situation. Cleveland furnaces are taking some business in foundry and malleable grades at \$17, with full differentials, but still seem willing to shade this price 25c. to 50c. a ton for shipment to competitive points. One Lake interest is able to make some small-lot sales at \$17.50. In Michigan the market is firm at \$18, furnace. The automotive industry has issued heavy shipping orders for March. While jobbing and other gray iron foundries in this territory are doing somewhat better than last month, they are taking iron in rather moderate volume and some of the furnaces are shipping less iron than they are making. Some of the stove manufacturers and other makers of heating equipment are not very busy. There is a little activity in low phosphorus iron. A Valley producer sold two lots aggregating 500 tons during the week at \$27, furnace. The American Steel & Wire Co. blew in one of its Central furnaces this week, now operating three out of four.

Prices per gross ton at Cleveland:

N'th'n No. 2 fdy., sil.	1.75 to 2.25	..... \$18.50
Southern fdy., sil.	1.75 to 2.25	..... 22.00
Malleable		..... 18.50
Ohio silvery, 8 per cent.		..... 28.00
Basic, Valley furnace		..... 17.00
Standard low phos., Valley furnace		..... \$26.50 to 27.00

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6 from Birmingham.

Semi-Finished Steel.—The present price of \$44, Cleveland and Pittsburgh, for wire rods has been established for the second quarter. Specifications for sheet bars, billets and slabs for March delivery have been fairly heavy and the leading local producer has placed two additional open-hearth furnaces in opera-

tion, now running 12 out of 14. Prices are unchanged at \$33, Cleveland, for the three products.

Wire Products.—The leading producer, effective March 5, opened its books for the second quarter at the present prices of \$2.65 per keg for wire nails and \$2.50 per 100 lb. for plain wire. Manufacturers' wire is moving well, but the demand for nails is moderate. Jobbers have large stocks bought late in the year at low prices and some are reported to be moving these stocks by meeting present mill prices.

Cold-Finished Steel Bars.—Specifications for March shipment against low-priced contracts are heavy. For current orders the market is firm at 2.35c., Cleveland. The second quarter price has not been announced. While there has been talk of a further advance, it seems probable that the present price will remain in effect.

Reinforcing Bars.—Inquiry is fair for small lots but no large projects are pending. New billet steel bars are still offered at 1.85c., Cleveland, and rail steel bars at 1.75c., mill. Stock prices continue irregular.

Sheets.—Mills have taken a fair amount of business in auto body sheets for the second quarter at the new 4.15c. price. Contracting for other grades is slow. Buyers show hesitancy because they do not seem convinced that the new prices will hold. Specifications for black and blue annealed sheets are fairly heavy and prices are firm. Some of the mills will be making shipments on present low-price contracts through the greater part of April. Galvanized sheets are still irregular but the price shading is attributed largely to jobbers who were able to place contracts late last year as low as 3.50c. Galvanized sheets sold during the week at 3.65c., Valley, equivalent to 3.55c., Pittsburgh, although 3.75c., Valley mill, is the more common minimum quotation.

Strip Steel.—Not much business in second quarter contracts for hot and cold-rolled strip has been taken at the higher prices recently announced, but the market appears firm at the new quotations. Specifications continue good.

Warehouse Business.—Jobbers are doing a fair volume of business, which shows a slight gain. With the approach of spring, galvanized sheets are moving better. Regular prices are well maintained.

Old Material.—With shipments still restricted by mills and no new demand, the market continues inactive. Dealers are buying very little scrap, as they have commitments for more than they can ship for some time. With the large output of the automotive industry, scrap is coming on the market faster than it is being absorbed and the tone of the market is weak. The local supply of old automobile cast scrap is in excess of the demand from Cleveland foundries and some of this grade is being shipped from here to Michigan points. This scrap is bringing \$15.50 to \$16 per net ton.

Prices per gross ton, delivered consumers' yards:
Basic Open-Hearth Grades

No. 1 heavy melting steel.....	\$13.75 to \$14.00
No. 2 heavy melting steel.....	13.25 to 13.50
Compressed sheet steel.....	12.75 to 13.00
Light bundled sheet stampings...	11.50 to 11.75
Drop forge flashings.....	12.50 to 13.00
Machine shop turnings.....	9.00 to 9.25
No. 1 railroad wrought.....	11.50 to 12.00
No. 2 railroad wrought.....	13.50 to 14.00
No. 1 busheling.....	11.00 to 11.25
Pipes and flues.....	9.00 to 9.50
Steel axle turnings.....	12.50 to 13.00

Acid Open-Hearth Grades

Low phosphorus forging crops...	16.50 to 17.00
Low phosphorus, billet, bloom and slab crops.....	17.00 to 17.50
Low phosphorus sheet bar crops...	16.50 to 17.00
Low phosphorus plate scrap.....	16.00 to 16.50

Blast Furnace Grades

Cast iron borings.....	10.00 to 10.25
Mixed borings and short turnings	10.00 to 10.25
No. 2 busheling.....	10.00 to 10.25

Cupola Grades

No. 1 cast.....	16.50 to 17.00
Railroad grate bars.....	11.00 to 12.00
Stove plate.....	12.00 to 12.50
Rails under 3 ft.....	18.00 to 18.50

Miscellaneous

Railroad malleable.....	15.00 to 15.50
Rails for rolling.....	16.25 to 16.50

Bolts, Nuts and Rivets.—Bolt and nut manufacturers have re-established the present discounts for the

second quarter, except on stove bolts, which have been advanced, new discounts being 80, 10 and 5 per cent off list. Rivet manufacturers have advanced large rivets \$3 a ton to \$2.90 per 100 lb., Pittsburgh and Cleveland, and \$3, Chicago, effective March 1. A leading local interest has made no announcement of a higher price for small lots, but will adhere to its usual policy of charging more for very small miscellaneous lots. The new prices will apply to second quarter contracts. For small rivets the present discount of 70 and 10 per cent off list, Pittsburgh and Cleveland, has been re-established for the second quarter. Bolt and nut and rivet manufacturers have opened their books for that delivery. Specifications for bolts and nuts are fair, but hardly up to expectations. The demand for rivets is rather slow.

Coke.—New demand for foundry coke is slow, but consumers are taking shipments fairly well against contracts. Prices are unchanged at \$8, Painesville, or \$9.01, delivered Cleveland, for by-product coke and \$3.75 and \$5.10 for Connellsville foundry coke. Yard dealers are stocking up on by-product coke for domestic use, which has become more active. The price is unchanged at \$4.50, Ohio ovens.

Jones & Laughlin Earned 6.9 Per Cent on Stockholders' Investment in 1927

The Jones & Laughlin Steel Corporation, in its pamphlet report for the year ended Dec. 31, last, shows a decrease of \$3,910,155 in net income, as compared with 1926, and an addition to surplus of \$4,293,002 or slightly more than half that added in the previous year. Stockholders' investment at the end of 1926 totaled \$163,638,470, comprising \$57,036,400 in preferred stock, \$57,332,000 in common stock and \$49,270,070 in surplus. The 1927 net income was equivalent to approximately 6.9 per cent on that investment, comparing with 9.8 per cent earned in 1926 on a stockholders' investment of \$155,124,635.

In 1927 the company produced 2,348,719 gross tons of ingots and shipped 1,937,645 net tons of steel products, comparing with 2,591,140 and 2,136,141 tons respectively in 1926.

Earnings and other statistics for the year compare with those for 1926 as follows:

	1927	1926	Decrease
Total earnings...	\$16,559,320	\$21,210,206	\$4,650,886
Depreciation and depletion reserve	4,572,359	5,210,631	638,272
Interest, etc.....	748,021	850,481	102,460
Net income.....	11,238,939	15,149,094	3,910,155
Dividends	6,945,937	6,570,859	*375,078
Surplus for year.....	4,293,002	8,578,235	4,285,233
Total surplus....	53,413,072	49,270,071	*4,143,001

*Increase.

	1927	1926
Production		
Iron ore, gross tons.....	1,679,619	2,584,342
Coal, net tons.....	2,461,466	4,950,563
Limestone, gross tons.....	607,079	550,449
Coke, net tons.....	2,298,050	2,401,774
Pig iron, gross tons.....	2,054,615	2,246,054
Ingots, gross tons.....	2,348,719	2,591,140

Shipments

All steel products, net tons..	1,937,645	2,136,141
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Inventories (value)

Raw materials.....	\$14,909,957	\$18,481,808
Manufacturing supplies and stores	3,468,335	3,602,027
Materials in process.....	4,456,633	4,865,575
Finished materials.....	7,375,376	5,961,688

Total	\$30,210,301	\$32,911,098
Total payroll.....	\$44,388,949	\$49,037,542
Average No. of employees...	21,810	23,760

Empire Steel Corporation Announces Further Sales Appointments

Glenn D. East, who was manager of sales of the Empire Steel Co., Cleveland, has been appointed Cleveland district sales manager of the new Empire Steel Corporation, succeeding F. F. Huber, formerly Cleveland sales manager of the Mansfield Sheet & Tin Plate Co., who will be transferred to the general sales office of the Empire Corporation in Mansfield. C. H. Beach, who represented the Mansfield Sheet & Tin Plate Co. in Indianapolis, has been appointed Indianapolis sales manager of the Empire Steel Corporation.

Boston

Large Pig Iron Sales Bring Out Low Prices—Scrap Weak

BOSTON, March 6.—Several thousand tons of pig iron were bought in this territory the past week, including 2000 tons of No. 2X and No. 1X by the General Fire Extinguisher Co., Providence, R. I., and 1000 tons of No. 2X by a central Massachusetts foundry. Most of this iron was for second quarter delivery. It is reported that the largest tonnages were sold on a basis of \$16, Buffalo, slightly higher for No. 2X, and \$17 for No. 1X. On small tonnages, Buffalo iron and iron made east of Buffalo sold generally on a basis of \$17, Buffalo, for No. 2X, and \$17.50 for No. 1X. Transactions included some western Pennsylvania and Southern iron at full prices for mixture purposes. Little eastern Pennsylvania or foreign iron is selling in New England at the moment.

Prices of foundry iron per gross ton, delivered to most New England points:

Buffalo, sil. 1.75 to 2.25.....	\$21.41 to \$21.91
Buffalo, sil. 2.25 to 2.75.....	21.41 to 22.41
East. Penn., sil. 1.75 to 2.25.....	23.15 to 23.65
East. Penn., sil. 2.25 to 2.75.....	23.65 to 24.15
Virginia, sil. 1.75 to 2.25.....	25.71
Virginia, sil. 2.25 to 2.75.....	26.21
Alabama, sil. 1.75 to 2.25.....	22.91 to 24.77
Alabama, sil. 2.25 to 2.75.....	23.41 to 25.27

Freight rates: \$4.91 from Buffalo, \$3.65 from eastern Pennsylvania, \$5.21 all rail from Virginia, \$6.91 to \$8.77 from Alabama.

Reinforcing Bars.—The local market for reinforcing bars is firmer. Some bids submitted on prospective business the past week were subsequently withdrawn, indicating higher prices. Mill representatives generally are holding to 1.90c. per lb., base Pittsburgh, but some business has been placed at 1.95c. Reinforcing bars from stock here are now generally 2.90c. per lb., base, compared with 2.75c. and 2.80c. a week ago.

Bars, Shapes and Plates.—Since mills announced an advance on bars, shapes and plates to 1.90c. per lb., base Pittsburgh, offers have been made consumers here at 1.85c. on contracts. Buying of finished material is light owing to the fact that most consumers and warehouses are well covered at 1.80c. Steel fabricators report practically no improvement in business, but say the outlook for early spring is encouraging.

Cold-Rolled Strip.—Although mills have opened books for second quarter, there has not been enough buying to test prices. On current business 3.15c. per lb., base Pittsburgh, prevails. The Worcester, Mass., mill is quoting 3.30c. per lb., base, on lots of 1 to 3 tons, and 3.05c. on larger lots.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams.....	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars and small shapes.....	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway, rounds	6.60c.
Norway, squares and flats.....	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold rolled steel—	
Rounds and hexagons.....	*3.45c. to 5.45c.
Squares and flats.....	*3.95c. to 6.95c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.50c.
Machine bolts	Per Cent Off List
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

Coke.—No improvement in the movement of by-product foundry coke is noted. Fuel is being billed at \$11.50 a ton, delivered within a \$3.10 freight rate zone. Demand for by-product domestic coke is fairly active on a basis of \$8.50 a ton on cars at ovens. The large New England producers still have sizable reserve stocks.

Warehouse Business.—Warehouse prices on cold-rolled strip steel have been advanced from \$5.10 to \$5.30 per 100 lb., base. Iron and steel products otherwise are unchanged in price despite the advance in mill quotations. The movement of iron and steel out of warehouses is fairly heavy, but individual orders call for small amounts. February billings were about 30 per cent larger than those for that month last year, but as January billings fell off, the showing for the year to date is only a little larger than 1927. One warehouse recently made 239 charges in one day, a new high record.

Old Material.—A further falling off in old material sales has caused a shading of prices on some grades, but in contrast railroad wrought is up 50c. a ton, and \$6 a ton on cars was the lowest price reported paid last week for mixed borings and turnings, as against \$5.75 the previous week. Prices on forged flashings take an unusually wide range. While \$8 a ton is the prevailing top on girder rails, \$8.10 was paid in at least one instance. Demand for steel turnings has fallen off. For shafting the average top price is \$13.50 a ton on cars, but selected stock for eastern Pennsylvania delivery, sold recently as high as \$14. Shipments of pipe have been held up by consumers. Borings are in limited supply. The General Electric Co., West Lynn, Mass., this week will close bids on 40 cars of miscellaneous material.

Buying prices per gross ton f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$9.00 to \$9.10
Scrap T rails	8.50 to 9.00
Scrap girder rails.....	7.50 to 8.00
No. 1 railroad wrought.....	10.50 to 11.00
No. 1 yard wrought.....	8.50 to 9.00
Machine shop turnings.....	5.75 to 6.25
Cast iron borings (steel works and rolling mill).....	6.00 to 6.25
Bundled skeleton, long.....	6.00 to 6.50
Forged flashings	6.10 to 7.00
Blast furnace borings and turnings	5.75 to 6.25
Forge scrap	6.00 to 6.50
Shafting	13.00 to 13.50
Steel car axles	15.00 to 15.50
Wrought pipe (1 in. in diameter, over 2 ft. long).....	7.50 to 8.25
Rails for rolling.....	10.00 to 10.50
Cast iron borings, chemical.....	9.50 to 10.00

Prices per gross ton delivered consumers' yards:

Textile cast	\$14.00 to \$14.50
No. 1 machinery cast.....	14.50 to 15.00
No. 2 machinery cast.....	12.50 to 13.00
Stove plate	10.50 to 11.00
Railroad malleable	13.50 to 14.00

Youngstown

Automobile Companies Specifying Steel Close to Requirements

YOUNGSTOWN, March 6.—With the exception of pipe, business in steel products is fairly satisfactory to manufacturers in this area. The automotive industry is taking sheets, bars and strips freely and makers of body sheets find it necessary to operate extra turns to satisfy delivery requirements. Automobile builders continue to place entire dependence upon the steel companies to produce and ship promptly and upon the railroads to deliver freight practically on an express schedule. The time was when they had at least two weeks' supply rolling; now in not a few products they are depending upon daily deliveries to maintain production schedules and inventories are not merely zero, they are zero minus, since it frequently happens that the arrival of a car of steel is the determining factor of maintenance of one department or another of automobile plants.

The backlogs of the mills in the area are for the most part the contracts written late last year, plus the additions that were allowed prior to the recent price advances. Specifications are coming along well, but there is not a company in the Youngstown district that can tell what its operations will be as much as two

weeks ahead, so closely are specifications confined to nearby requirements.

The district is producing steel ingots at about 75 per cent of capacity, which is fairly good considering the smallness of the demand for pipe. That product may do better later on when the oil industry gets straightened out. Some think that such a development is nearer, in view of the strengthening tendency in oil prices, but just now there is at best only a moderate demand for oil country pipe, while line pipe orders are pretty well completed and the call for standard-weight pipe for building and construction work, though fairly good, is not yet up to the average of a year ago.

Some complaint is heard over prices, since the bulk of the movement is at lower figures than now are quoted and buyers have had such full coverage at the lower quotations that there is not much hope of net returns being better until after the turn of the second quarter because buyers under contract have until the end of this month to specify against their commitments. Manufacturers here still find prices competitive and do not take as cheerful a view of the situation as might be expected with a steady flow of specifications and production and shipments in keeping with that fact.

Bars now are quoted at 1.90c., base Pittsburgh, for large lots and 2c. for small lots, but it is admitted that not much business has been done at these prices, while it was necessary because of competitive conditions to take considerable business at 1.85c. Some success has attended the effort to establish sheets at 2.90c., base Pittsburgh, for black, 3.75c., base, for galvanized and 2.10c. base, for narrow, and 2.20c., base, for wide blue annealed, although getting the full price on galvanized remains difficult.

The Republic Iron & Steel Co. is making good progress in getting its spike-making equipment installed and expects to be producing in another 60 days.

Youngstown district steel makers are much interested in the proposal of the Pittsburgh Coal Co. to connect the district with the Ohio River through an extension of its Pittsburgh, Lisbon & Western Railroad, but are not yet ready to go on record as believing that the project will materialize. It is recognized that a railroad built solely to give Youngstown a river-rail service on coal would hardly pay unless it had something to carry on the return trip. It is also realized that existing railroads are likely to oppose the building of the line on the ground that additional trackage is not needed. It is probable that James A. Campbell, who on his way south a few weeks ago conferred with presidents of the railroads serving this district, may have some views on the matter when he returns this week.

In view of the suggestion that one end of the proposed road would connect with the Erie Railroad just outside Youngstown, some believe the move is being sponsored by that road, which lately has not been getting much of the soft coal that has been moving to the Lakes. There is also a suggestion that the request for permission to build the new line is an effort by the Pittsburgh Coal Co. to force existing railroads to do something about coal freight rates that would not merely open up the Youngstown district to greater tonnages of river coal, but would help the coal companies to more speedily recover the lost Lake trade.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and structural shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-finished rounds, shafting and screw stock.....	3.75c.
Black sheets (No. 24).....	4.45c.
Galvanized sheets (No. 24).....	5.25c.
Blue annealed sheets (No. 10).....	3.60c.
Black corrugated sheets (No. 24).....	4.50c.
Galvanized corrugated sheets.....	5.30c.
Structural rivets.....	3.75c.
Boiler rivets.....	3.75c.
Per Cent Off List	
Tank rivets, $\frac{7}{8}$ -in. and smaller, 100 lb. or more.....	70
Less than 100 lb.....	65
Machine bolts.....	60
Carriage bolts.....	60
Lag screws.....	60
Hot-pressed nuts, square, blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hexagons, blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

St. Louis

Wabash Buys 5000 Tons of Tie Plates —Pig Iron Quieter

ST. LOUIS, March 6.—The pig iron market is quiet. Sales for the last week amounted to about 3000 tons, ranging from 500 tons for a district melter to a car-load. A radiator manufacturer is in the market for a round tonnage, including 2000 to 2500 tons for its plants in this district, for second quarter delivery. Melters are well supplied with pig iron for the remainder of first quarter, and very little interest is being taken in second quarter requirements.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25 f.o.b.	
Granite City, Ill.	\$19.50 to \$20.00
Northern No. 2 fdy., delivered	
St. Louis	20.66
Southern No. 2 fdy., delivered...	20.42
Northern malleable, delivered.....	20.66
Northern basic, delivered	20.66

Freight rates: 81c. from Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Iron and Steel.—The Wabash Railway has placed orders for 5000 tons of tie plates in equal amounts with Southwestern and Eastern mills at what a purchaser would call "attractive" prices. Buying of plates, shapes and bars for second quarter is fairly large. Warehouse business is picking up, February's sales being about 10 per cent ahead of January's, although 10 per cent less than in February, 1927. Business with structural fabricators is light.

Coke.—Demand for domestic grades of coke is holding up very well, especially in view of warmer weather in this section. A fairly good demand is reported for foundry grades. Prices are unchanged.

Old Material.—Although consumption of old material in the St. Louis district continues heavy, mills have ceased buying until they have liquidated stocks on hand and material still to be delivered on contracts. It is not expected the mills will resume buying until late in March. The result is the market is weaker. Heavy melting steel, heavy shoveling steel, No. 2 railroad wrought, while steel rails less than 3 ft. are 25c. a ton lower, while steel car axles and cast iron carwheels are off 50c. The remainder of the list is unchanged. Railroad lists include: Pennsylvania, 39,435 tons; Baltimore & Ohio, 9670 tons; Missouri Pacific, 4200 tons; New Orleans & Great Northern, 355 tons; Frisco lines, 55 car-loads.

Prices per gross ton f.o.b. dealers' yards and delivered St. Louis district consumers' works:

Heavy melting steel.....	\$11.50 to \$12.00
No. 1 locomotive tires.....	12.75 to 13.25
Heavy shoveling steel.....	11.50 to 12.00
Miscellaneous standard-section rails, including frogs, switches and guards, cut apart.....	14.00 to 14.50
Railroad springs	14.50 to 14.75
Bundled sheets	8.75 to 9.25
No. 2 railroad wrought.....	11.50 to 12.00
No. 1 busheling.....	9.75 to 10.25
Cast iron borings.....	9.00 to 9.50
Iron rails	13.00 to 13.50
Rails for rolling.....	14.25 to 14.75
Machine shop turnings.....	7.50 to 8.00
Steel car axles	19.00 to 19.50
Iron car axles.....	24.00 to 24.50
Wrought iron bars and transoms.....	21.00 to 21.50
No. 1 railroad wrought.....	10.00 to 10.50
Steel rails, less than 3 ft.....	15.50 to 16.00
Steel angle bars.....	12.50 to 13.00
Cast iron carwheels.....	13.50 to 14.00
No. 1 machinery cast.....	14.00 to 14.50
Railroad malleable.....	11.00 to 11.50
No. 1 railroad cast.....	13.50 to 14.00
Stove plate	13.00 to 13.50
Agricultural malleable	12.00 to 12.50
Relaying rails, 60 lb. and under...	20.50 to 23.50
Relaying rails, 70 lb. and over...	26.50 to 29.00

Manufacturing production in the United States in January is placed by the Department of Commerce at 116, on a basis of 100 in 1919. Iron and steel ranks high, at 130, with other metals at 139 and automobiles at 132.

More beehive coke was made in February than in January, according to the United States Bureau of Mines. The gain was from 376,000 net tons to 390,000 tons. Both were far below the 754,000 tons of February, 1927.

Buffalo

Pig Iron Inquiry Falls Off—Large Sale of Steel Mill Scrap

BUFFALO, March 6.—Inquiry for pig iron has fallen off and the lots that producers are quoting on are comparatively small. Carload lots are in demand and a few 200 to 300-ton inquiries are out but the larger consumers seem to have covered for nearby requirements, though there is considerable iron yet to be placed for second quarter. The price of \$17 is steady in the district, though it is understood that a \$16.50 quotation is still being offered to New England consumers by one Buffalo maker. Bethlehem has five stacks blowing; Donner Steel Co., two; Hanna Furnace Co., three; Wickwire-Spencer, one, and Tonawanda Iron Corporation, one.

Prices per gross ton, f.o.b. furnace:

No. 2 plain fdy., sil. 1.75 to 2.25.....	\$17.00
No. 2X foundry, sil. 2.25 to 2.75.....	17.50
No. 1X foundry, sil. 2.75 to 3.25.....	18.50
Malleable, sil. up to 2.25.....	\$17.00 to 17.50
Basic.....	16.50 to 17.00
Lake Superior charcoal.....	27.28

Old Material.—A large sale of heavy melting steel, No. 1 and No. 2 grade, hydraulic compressed sheets and No. 1 busheling was made in the week. It is said that between 30,000 and 40,000 tons of material was involved. The price paid was around \$14.50 to \$14.75 for the No. 1 heavy melting steel, with \$1.50 lower for the other grades. The specifications are slightly different from those of another mill which paid \$15.25 for its last tonnage of heavy melting steel, around 8000 tons being involved in that purchase. Another sale of 1000 tons of No. 2 steel was recently made at \$12.75, delivered.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades

No. 1 heavy melting steel.....	\$14.75 to \$15.25
No. 2 heavy melting steel.....	13.00 to 13.50
Scrap rails.....	13.75 to 14.25
Hydraulic compressed sheets.....	13.25 to 13.75
Hand bundled sheets.....	9.00 to 9.50
Drop forge flashings.....	12.00 to 12.50
No. 1 busheling.....	13.25 to 13.75
Heavy steel axle turnings.....	12.75 to 13.25
Machine shop turnings.....	8.50 to 9.00

Acid Open-Hearth Grades

Railroad knuckles and couplers..	16.00 to 16.50
Railroad coil and leaf springs...	15.50 to 16.00
Rolled steel wheels.....	15.75 to 16.25
Low phosphorus billet and bloom ends.....	17.00 to 17.50

Electric Furnace Grades

Heavy steel axle turnings.....	12.75 to 13.25
Short shoveling steel turnings....	11.00 to 11.50

Blast Furnace Grades

Short shoveling steel turnings...	10.75 to 11.00
Short mixed borings and turnings	10.00 to 10.50
Cast iron borings.....	10.00 to 10.50
No. 2 busheling.....	9.00 to 9.50

Rolling Mill Grades

Steel car axles.....	17.00 to 17.50
Iron axles.....	22.00 to 23.00
No. 1 railroad wrought.....	12.50 to 13.00

Cupola Grades

No. 1 machinery cast.....	14.50 to 15.00
Stove plate.....	13.00 to 13.25
Locomotive grate bars.....	11.50 to 12.00
Steel rails, 3 ft. and under.....	17.00 to 17.25
Cast iron carwheels.....	13.00 to 13.50

Malleable Grades

Railroad.....	15.50
Agricultural.....	15.50
Industrial.....	15.50

Finished Iron and Steel.—Mill operation continues to improve. Bar, shape and plate mills are adhering to 2c., Lackawanna, for nearby delivery, or 1.90c., Pittsburgh, depending on the location. The market for automobile body sheets is particularly good. The Donner Steel Co. has established a cold-drawn department for

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and structural shapes.....	3.40c.
Soft steel bars.....	3.30c.
Reinforcing bars.....	2.75c.
Cold-finished flats, squares and hexagons.	4.45c.
Rounds.....	3.95c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.30c.
Galvanized sheets (No. 24).....	5.15c.
Blue annealed sheets (No. 10).....	3.80c.
Common wire nails, base per keg.....	\$3.65
Black wire, base per 100 lb.....	3.90

carbon and alloy steel, though specializing in alloy. Bolt and nut specifications are better. A steel fabricator has obtained the contract for 550 tons of structural steel for a high school at Kenmore, N. Y.

Canada

Growing Demand Across Border for Iron and Steel Products

TORONTO, ONT., March 6.—Canadian steel companies report a growing demand for iron and steel products. In addition to orders booked for domestic consumption, Canadian interests have closed some contracts for export. The Algoma Steel Corporation, Sault Ste. Marie, Ont., reports its plant running on double shift with approximately \$8,000,000 worth of orders on its books. The British Empire Steel Corporation, Sydney, N. S., has upward of \$5,000,000 worth of orders ahead.

R. J. Magor, Dominion Iron & Steel Co., is en route to Europe to negotiate iron ore business, particularly in Germany and England, the ore to be supplied by the company's mines in Newfoundland. Iron ore contracts already closed for this year's delivery include 800,000 tons for delivery to Germany and 100,000 tons for delivery to the United States, in addition to upward of 400,000 tons to be shipped to the company's own furnaces at Sydney, N. S.

Pig Iron.—Business in this market shows very little change from last week. Demand is increasing, but sales for the week were chiefly for spot delivery. Inquiries are appearing for second quarter. A small number of melters have already covered for second quarter needs, but the majority have yet to make known their requirements.

Prices per gross ton:

Delivered Toronto

No. 1 foundry, sil. 2.25 to 2.75.....	\$23.60
No. 2 foundry, sil. 1.75 to 2.25.....	23.60
Malleable.....	23.60

Delivered Montreal

No. 1 foundry, sil. 2.25 to 2.75....	\$25.00 to \$25.50
No. 2 foundry, sil. 1.75 to 2.25...	25.00 to 25.50
Malleable.....	25.00 to 25.50
Basic.....	24.00

Imported Iron at Montreal Warehouse

Summerlee.....	33.50
Carron.....	33.00

Old Material.—Business is increasing and individual orders call for larger tonnages. Canadian interests are of the opinion that the bottom has been reached. Prices are firm but unchanged.

Dealers' buying prices:

Per Gross Ton

	Toronto	Montreal
Heavy melting steel.....	\$9.00	\$8.00
Rails, scrap.....	10.00	10.00
No. 1 wrought.....	9.00	11.00
Machine shop turnings.....	7.00	6.00
Boiler plate.....	7.00	7.00
Heavy axle turnings.....	7.50	7.50
Cast borings.....	7.50	6.00
Steel turnings.....	7.00	6.50
Wrought pipe.....	5.00	6.00
Steel axles.....	14.00	19.00
Axles, wrought iron.....	16.00	21.00
No. 1 machinery cast.....	16.00	16.00
Stove plate.....	12.00	12.00
Standard carwheels.....	14.50	14.50
Malleable.....	13.00	13.00

Per Net Ton

No. 1 machinery cast.....	15.00	....
Stove plate.....	9.00	....
Standard carwheels.....	13.00	....
Malleable scrap.....	13.00	....

Birmingham

Pig Iron Buying Improves—Steady Flow of Steel Orders

BIRMINGHAM, March 6.—There was some improvement in the last week in pig iron buying. A number of plants had underestimated their requirements and came into the market for March fill-in tonnage. Some of the larger pipe plants are expected to place additional tonnage soon. There has been very little second quarter business, but some of the iron already booked

will be carried forward. Quotations for foundry iron continue on a \$16 base. The two new 600-ton Fairfield furnaces of the Tennessee Coal, Iron & Railroad Co. probably will be ready for operation some time next month. Seventeen blast furnaces are in operation, nine on foundry iron.

Prices per gross ton, f.o.b. Birmingham district furnaces:

No. 2 foundry, 1.75 to 2.25 sil.	\$16.00
No. 1 foundry, 2.25 to 2.75 sil.	16.50
Basic	15.00

Finished Steel.—New business is steadily coming in and inquiries indicate that a substantial tonnage is in prospect for second quarter. Bookings in some lines exceed current production, and forward tonnage is accumulating. Structural steel fabricators received several new orders last week, each being about 100 tons. Open-hearth operations are unchanged, the Tennessee company operating 13 and 14 and the Gulf States Steel Co. four.

Cast Iron Pipe.—A normal amount of new tonnage in small lots is being received. No large orders are reported. Plant operations have changed but little within the past several weeks. These are at a fair level due to accumulation of small orders. Quotations continue on a \$29 to \$30 base. The National Cast Iron Pipe Co. has awarded the structural steel contract for an addition to the Virginia Bridge & Iron Co.

Coke.—Spot demand is not active and little interest is being shown in second quarter tonnage. Quotations for March and second quarter remain at \$5.

Old Material.—No improvement is reported in demand. The market has been quiet and prices stationary for some time.

Prices per gross ton, delivered Birmingham district consumers' yards:

Heavy melting steel	\$9.50 to \$10.00
Scrap steel rails	11.00 to 11.50
Short shoveling turnings	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Stove plate	13.00 to 14.00
Steel axles	19.00 to 20.00
Iron axles	20.00 to 21.00
No. 1 railroad wrought	10.00 to 10.50
Rails for rolling	13.00
No. 1 cast	15.00
Tramcar wheels	12.50 to 13.50
Cast iron carwheels	12.00 to 13.00
Cast iron borings, chemical	13.50 to 14.00

Cincinnati

Pig Iron Sluggish—Scrap Weak—Steel Demand Steady

CINCINNATI, March 6.—Pig iron buyers are manifesting little interest in second quarter needs, with the result that the local market is sluggish. Aside from 1000 tons of malleable for a Parkersburg, W. Va., company and 500 tons of malleable for a Tennessee melter, inquiries are of little consequence. Sales likewise have been unimportant, the largest in the past week having called for 300 tons of foundry iron. The price situation is slightly firmer, with northern Ohio furnaces having advanced to a minimum of \$16.75, base furnace, and some makers having quoted as high as \$17.50. Ironton producers are holding firmly to \$19, base furnace, and in the South both Alabama and Tennessee interests are

maintaining foundry iron on a basis of \$16, Birmingham, although movement of material into this territory is light. Demand for Jackson County silvery iron is only fair. Extensive improvements to the blast furnace of the Norton Iron Works Co. at Ashland, Ky., are nearing completion, but it probably will not be lighted for 30 to 60 days.

Prices per gross ton, delivered Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	\$20.89
So. Ohio malleable	\$20.14 to 20.89
Alabama fdy., sil. 1.75 to 2.25	19.69
Alabama fdy., sil. 2.25 to 2.75	20.19
Tennessee fdy., sil. 1.75 to 2.25	19.69
Southern Ohio silvery, 8 per cent	26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Material.—Specifications against current contracts have been liberal in the past week and forward buying is beginning to assume larger proportions. Many consuming industries are slowly increasing operations, but have not reached the point where they need to augment present stocks. The Stacey Mfg. Co., this city, has contracted for the erection of three gas tanks requiring about 1400 tons of steel. Bars, structural shapes and plates are quoted at 1.90c., base Pittsburgh. Sheet manufacturers are booking heavy specifications applying against present contracts, and new sales for second quarter delivery have been on the basis of 3.75c., base Pittsburgh, for galvanized, 2.90c. for black, 2.10c. for blue annealed and 4.15c. for automobile body stock. The only variation is to be found in light gage galvanized sheets for roofing purposes, which are being sold at concessions of from \$2 to \$3 a ton. Movement of wire goods has been about normal. Common wire nails are quoted at \$2.65 per keg, base Ironton or Pittsburgh, and plain wire at \$2.50 per 100 lb., Ironton or Pittsburgh.

Reinforcing Bars.—Rail steel bars are quoted mostly at 1.80c. or 1.85c., base mill, and it is becoming less easy to get large tonnages at 1.75c. Makers of new billet stock are asking from 1.90c. to 2c., base Pittsburgh.

Warehouse Business.—Local jobbers report that sales have been only fair. The number of orders has been liberal, but the total tonnage is below that in the same period of 1927. In view of the upward trend of mill prices, the schedule for delivery from Cincinnati warehouses is firm.

Coke.—An increase in the foundry melt in this district is responsible for heavier shipments of by-product foundry coke, the production of which has been expanded in the Portsmouth-Ironton district. The Portsmouth By-product Coke Co. has permanently doubled its output, while an Ironton company, formerly manufacturing furnace coke, has gone over to foundry coke principally because of the fact that no merchant blast furnaces at Ironton are active. Quotations of Wise County and New River bee-hive coke remain firm and unchanged.

Foundry coke prices per net ton, delivered Cincinnati: By-product coke, \$9.52 to \$9.64; Wise County coke, \$7.59 to \$8.09; New River coke, \$10.09 to \$10.59. Freight rates, \$2.14 from Ashland, Ky.; \$2.59 from Wise County and New River ovens.

Old Material.—Melting steel has declined 50c. a ton and a number of other items are off from 50c. to 75c. a ton because of the lack of interest on the part of consumers and the refusal of steel plants to buy material unless concessions are made. Dealers are of the opinion that quotations are likely to remain at about their present level during the next month.

Dealers' buying prices per gross ton f.o.b. cars, Cincinnati:

Heavy melting steel	\$11.00 to \$11.50
Scrap rails for melting	11.75 to 12.25
Loose sheet clippings	8.50 to 9.00
Bundled sheets	9.50 to 10.00
Cast iron borings	8.00 to 8.50
Machine shop turnings	7.50 to 8.00
No. 1 busheling	10.00 to 10.50
No. 2 busheling	7.00 to 7.50
Rails for rolling	12.50 to 13.00
No. 1 locomotive tires	12.75 to 13.25
No. 1 railroad wrought	10.50 to 11.00
Short rails	16.00 to 16.50
Cast iron carwheels	12.25 to 12.75
No. 1 machinery cast	15.50 to 16.00
No. 1 railroad cast	13.00 to 13.50
Burnt cast	7.50 to 8.00
Stove plate	8.25 to 8.75
Brake shoes	9.50 to 10.25
Railroad malleable	12.25 to 12.75
Agricultural malleable	11.75 to 12.25

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and structural shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforcing bars	3.15c.
Rail steel reinforcing bars	3.00c.
Hoops	4.00c. to 4.25c.
Bands	3.95c.
Cold-finished rounds and hexagons	3.85c.
Squares	4.35c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue annealed sheets (No. 10)	3.60c.
Structural rivets	3.85c.
Small rivets	.65 per cent off list
No. 9 annealed wire, per 100 lb.	\$3.00
Common wire nails, base per keg	2.95
Cement coated nails, base 100 lb. keg	2.95
Chain, per 100 lb.	7.55
	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.	\$18.00
4-in.	38.00
Seamless steel boiler tubes, 2-in.	19.00
4-in.	39.00

San Francisco

Structural Steel, Plates and Cast Iron Pipe Fairly Active

SAN FRANCISCO, March 3 (*By Air Mail*).—Movement of steel products generally is being well maintained and some fair-sized structural plate and cast iron pipe awards were made this week. Awards included 1200 tons of plates for a penstock for the Southern California Edison Co., Los Angeles, and 1000 tons of plates for a municipal pipe line at Tacoma. Prices appear to be holding fairly firm.

Pig Iron.—Another shipment of Indian iron has arrived on the Coast, 1000 tons being unloaded at San Francisco and 400 at Los Angeles. Most of this was used to apply against contracts. The next shipment of Indian pig is due here during the first half of the month, about 1250 tons being aboard. Demand is only fair. Little improvement is noted in the rate of operations among foundries. No change in prices is noted.

Prices per gross ton at San Francisco:

*Utah basic	\$25.00 to \$26.00
*Utah foundry, sil. 2.75 to 3.25...	25.00 to 26.00
**Indian foundry, sil. 2.75 to 3.25...	24.00 to 25.00
**German foundry, sil. 2.75 to 3.25.	24.25

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Shapes.—The two outstanding structural awards of the week involved 800 tons for a power house at San Diego for the San Diego Consolidated Gas & Electric Co., booked by the McClintic-Marshall Co., and 480 tons for the Heinz plant addition in Berkeley, secured by Judson-Pacific Co. Awards this week exceeded 1800 tons. Considerable new work is in sight. Bids are being taken on 4000 tons for the Capwell store in Oakland and on 3000 tons for the Coyote Point bridge across San Francisco Bay. Pending business totals over 16,000 tons. While fabricated prices are still low in many instances, due to foreign competition of plain material, domestic plain shapes continue firm at 2.35c. c.i.f.

Plates.—Awards of plates during the past week were the heaviest of any week so far this year. The Southern Pacific Co. has placed a contract with an unnamed mill for three months' requirements, totaling about 400 to 500 tons. A pipe line project at Milton, Ore., involving 625 tons, was booked by King Brothers' Boiler Works. The Southern California Edison Co. has placed 800 tons and 400 tons respectively with the Western Pipe & Steel Co. and the Lacy Mfg. Co. for a penstock. The Birchfield Boiler Works, Tacoma, took 1015 tons of $\frac{1}{4}$ and $\frac{5}{16}$ in. material for a pipe line for the city. Bids were opened this week on 2000 tons for a penstock at Seattle and the Navy Department has taken bids on 750 tons for Western yards. Prices are firm at 2.30c., c.i.f.

Bars.—Awards of reinforcing steel were mostly lots of less than 100 tons. A San Francisco jobber took 200 tons for a store in San Francisco and a memorial building at Oakland. Bids were opened this week on 1950 tons for Pier 48, San Francisco, and an award is expected soon. Foreign competition continues to keep the out-of-stock price in the bay district low and 2.25c. is being quoted. On the other hand, some interests using domestic material report the booking of less than carload lots at 2.75c. and larger lots from 2.50c. to 2.60c. High carbon angles range from 2.35c. to 2.40c., c.i.f., including extra for carbon. High carbon reinforcing bars are quoted the same as structural material, namely, 2.35c., c.i.f.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and structural shapes	3.15c.
Soft steel bars	3.15c.
Small angles, $\frac{1}{4}$ -in. and over	3.15c.
Small angles, under $\frac{1}{4}$ -in.	3.55c.
Small channels and tees, $\frac{3}{4}$ -in. to $2\frac{3}{4}$ -in.	3.75c.
Spring steel, $\frac{1}{4}$ -in. and thicker	5.00c.
Black sheets (No. 24)	4.95c.
Blue annealed sheets (No. 10)	3.90c.
Galvanized sheets (No. 24)	5.50c.
Structural rivets, $\frac{1}{2}$ -in. and larger	5.65c.
Common wire nails, base per keg	\$3.40
Cement coated nails, 100-lb. keg	3.40

Cast Iron Pipe.—Awards were as follows: 218 tons of 12-in. class 150 universal pipe for Colfax, Wash., to Central Foundry Co.; 155 tons 4 to 10-in. for Modesto, Cal., to Grinnell Co. and the Pacific States Cast Iron Pipe Co.; the Southern Pacific Co., San Francisco, has placed 560 tons of 4 to 12-in. class B pipe with unnamed interests; James Young, Oakland, took 145 tons of 4 and 6-in. pipe for the fair grounds at Sacramento, Cal.; Grinnell Co. secured 624 tons of 6 to 12-in. class D pipe for Vancouver, B. C., and Leith Murray & Co. took 619 tons of 6 and 8-in. class C for the same city; Lafayette, Colo., has placed with an unnamed interest 651 tons of 4 to 12-in. class B pipe and the United States Cast Iron Pipe & Foundry Co. booked 128 tons of 48-in. class A pipe for Los Angeles. Bids were opened this week on 663 tons of 6 to 20-in. classes B and C pipe for Santa Barbara, Cal., and on 188 tons of 20-in. class C pipe for Tacoma, Wash. The National Cast Iron Pipe Co. was low bidder on 136 tons of 18-in. class C pipe for San Diego, Cal. Other pending business includes 3095 tons of 4 to 12-in. class B pipe for Southgate, Cal., and 222 tons of 4 and 8-in. class B for Armona, Cal.

Steel Pipe.—The Petroleum Securities Co., Los Angeles, has placed 650 tons of $3\frac{1}{2}$ to 16-in. plain-end line pipe with the American Seamless Tube Co. and the South Chester Tube Co. for its new Richmond, Cal., plant. The Pacific Gas & Electric Co. has placed 1472 tons of 2 to 16-in. line pipe and 518 tons of $\frac{3}{4}$ to 3-in. black pipe with unnamed interests. The Standard Oil Co., San Francisco, is reported to be in the market for 22,000 tons of 8-in. line pipe for a line from Pasotex to El Paso, Tex.

Coke.—A shipment of English bee-hive and by-product foundry coke is scheduled to arrive about the middle of the month. There will be approximately 4000 tons aboard, part of it for Los Angeles and part for San Francisco consumers. By-product material is quoted from \$11.50 to \$13 a net ton at dock, depending upon the quality, while bee-hive coke is quoted at from \$16 to \$17 a net ton.

Detroit Scrap Market Shows Further Weakness

DETROIT, March 6.—Further reductions in the scrap market in this district were noted during the past week. Blast furnace materials showed the greatest declines. This is due in part to the large tonnage coming from producers and the fact that shipments to some districts have been restricted.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Heavy melting and shovelling steel	\$11.00 to \$11.50
Borings and short turnings	7.25 to 7.75
Long turnings	6.75 to 7.25
No. 1 machinery cast	14.00 to 15.00
Automobile cast	19.50 to 21.00
Hydraulic compressed sheets	10.00 to 10.15
Stove plate	11.00 to 12.00
No. 1 bushelling	8.50 to 9.00
Sheet clippings	6.00 to 7.00
Flashings	9.25 to 9.75

Permanent-Magnet Steel

Principles governing the choice and utilization of permanent-magnet steels are discussed in scientific paper No. 567 of the United States Bureau of Standards, which was prepared by Raymond L. Sanford, physicist of the bureau. A copy of this paper may be obtained from the Superintendent of Documents, Government Printing Office, Washington, for 5c. It was found that the addition of substantial percentages of cobalt to the composition of permanent-magnet steels leads to markedly superior qualities. Inasmuch as the cost of cobalt steels is much greater than that of older types, their use may be warranted only under special circumstances. Criteria for the comparison of the quality of magnet steels are discussed, and conditions are outlined under which the use of the more expensive steels is justified.

NON-FERROUS METAL MARKETS

The Week's Prices		Mar. 6	Mar. 5	Mar. 3	Mar. 2	Mar. 1	Feb. 29
	Lake copper, New York....	14.25	14.20	14.20	14.20	14.20	14.20
	Electrolytic copper, N. Y.*...	14.00	13.75	13.62½	13.62½	13.62½	13.62½
	Straits tin, spot, N. Y.....	51.62½	52.00	...	51.50	51.37½	51.25
	Lead, New York.....	6.00	6.00	6.00	6.00	6.00	6.00
	Lead, St. Louis.....	5.75	5.75	5.75	5.75	5.75	5.75
	Zinc, New York.....	5.85	5.82½	5.80	5.80	5.80	5.80
	Zinc, St. Louis.....	5.50	5.47½	5.45	5.45	5.45	5.45

Cents per Pound
for
Early Delivery

*Refinery quotation; delivered price ¼c. higher.

NEW YORK, March 6.—There are signs of more activity and strength in several of the markets. Concessions on copper have virtually disappeared and inquiry is better. Demand for tin is moderate at practically unchanged prices. The lead market is more active and prices are firm. Quotations for zinc have started to advance and buying is a little better.

Copper.—After several weeks of decided inactivity and some weakness in prices, the market yesterday and today has turned stronger. One cause is advancing prices in London. Electrolytic copper, which was available from two or three sources as low as 13.87½c., delivered in the Connecticut Valley last week, is reported unobtainable today below 14.12½c., the price which leading producers have been quoting for some weeks. Sales to domestic consumers thus far have been light at any price, but inquiry has improved and it is stated that considerable metal must yet be bought even for March consumption. Last week Russia bought about 3500 tons and today buying for export has been considerably better, with sales estimated at over 2000 tons today and about 1000 tons yesterday. The official quotation of Copper Exporters, Inc., is unchanged at 14.50c., c.i.f. usual European ports. Sellers generally today are more optimistic than in some time and predict higher prices.

Copper Averages.—The average price of Lake copper for February, based on daily quotations in THE IRON AGE, was 14.24c. The average price of electrolytic copper was 13.82c., refinery, or 14.07c., delivered in the Connecticut Valley.

Metals from New York Warehouse

Delivered Prices Per Lb.

Tin, Straits pig.....	53.25c. to 54.25c.
Tin, bar.....	55.25c. to 56.25c.
Copper, Lake.....	15.25c.
Copper, electrolytic.....	15.00c.
Copper, casting.....	14.25c.
Zinc, slab.....	6.75c. to 7.25c.
Lead, American pig.....	7.00c. to 7.50c.
Lead, bar.....	9.25c. to 10.25c.
Antimony, Asiatic.....	12.50c. to 13.00c.
Aluminum No. 1 ingot for remelting (guaranteed over 99 per cent pure).....	27.00c. to 28.00c.
Aluminum ingots, No. 12 alloy.....	26.00c. to 27.00c.
Babbitt metal, commercial grade.....	30.00c. to 40.00c.
Solder, ½ and ½.....	34.00c. to 35.00c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig.....	56.50c.
Tin, bar.....	58.50c.
Copper, Lake.....	15.00c.
Copper, electrolytic.....	15.00c.
Copper, casting.....	14.25c.
Zinc, slab.....	7.50c.
Lead, American pig.....	6.85c.
Antimony, Asiatic.....	16.00c.
Lead, bar.....	9.25c.
Babbitt metal, medium grade.....	19.25c.
Babbitt metal, high grade.....	61.50c.
Solder, ½ and ½.....	33.75c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass.....	18.50c. to 19.25c.
Copper, hot rolled.....	22.75c. to 23.75c.
Copper, cold rolled, 14 oz. and heavier, 25.25c. to 26.25c.	
Seamless Tubes—	
Brass.....	23.37½c. to 24.37½c.
Copper.....	24.50c. to 25.50c.
Brazed Brass Tubes.....	26.50c. to 27.50c.
Brass Rods.....	16.25c. to 17.25c.

From New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets, (No. 9), casks.....	10.00c. to 10.50c.
Zinc sheets, open.....	10.50c. to 11.00c.

Tin.—In an unusually quiet market sales were light for the week ended Saturday, March 3, totaling scarcely 600 tons. Dealers did most of the buying, consumers being inactive and uninterested. Yesterday, Monday, dealers bought the greater part of the 200 tons which changed hands and today the market was extremely quiet. Spot Straits tin today was quoted at 51.62½c., New York. Prices in London today were only slightly higher than a week ago, with spot standard quoted at £231 17s. 6d., future standard at £234 2s. 6d., and spot Straits at £235 17s. 6d. The Singapore market today was £237 10s. Statistics for February were considered very unfavorable, but the market has been holding well in spite of this. There was an increase in the world's visible supply of 2401 tons, which was considerably more than the 1500 to 2000 tons expected. Straits shipments were very large at about 8400 tons, while Banca shipments were small at 695 tons. Deliveries of metal in the United States were 5790 tons, which was lower than expected. Stocks of tin in the United Kingdom were 3240 tons of all brands and about 10,300 tons is reported as in sight for American consumers. Arrivals thus far this month have been 605 tons, with 8360 tons reported afloat.

Lead.—Consuming demand is reported more active and dealers are inclined to buy futures. The market in general is stronger in tone because of higher prices in London. The leading interest during the week changed its quotation to 6c., New York, as its contract price, which continues firm. In the outside market quotations are steady at 5.75c., St. Louis.

Zinc.—With higher prices for ore last Saturday and with a stronger market in London, prime Western zinc here has begun to develop strength and quotations are tending higher. The market today is stronger, with slab zinc quoted and sold at 5.50c., St. Louis, or 5.85c., New York. While demand is not heavy, a fair amount of buying is reported and specifications from consum-

Non-Ferrous Rolled Products

Mill prices on bronze, brass and copper products have not changed for more than three months. Lead full sheets and zinc sheet are being quoted at the reductions of Feb. 21 and 27 respectively.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass.....	18.75c.
Copper, hot rolled.....	22.75c.
Zinc.....	9.50c.
Lead (full sheets).....	9.75c. to 10.00c.
Seamless Tubes—	
High brass.....	23.62½c.
Copper.....	24.50c.
Rods—	
High brass.....	16.50c.
Naval brass.....	19.25c.
Wire—	
Copper.....	15.75c.
High brass.....	19.25c.
Copper in Rolls.....	21.75c.
Brazed Brass Tubing.....	26.75c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also allowed to St. Louis on shipments to destinations west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide....	33.00c.
Tubes, base.....	42.00c.
Machine rods.....	34.00c.

Rolled Metals, f.o.b. Chicago Warehouse (Prices Cover Trucking to Consumers' Doors in City Limits)

	Base per Lb.
Sheets—	
High brass	18.75c.
Copper, hot rolled	22.75c.
Copper, cold rolled, 14 oz. and heavier ..	25.00c.
Zinc	11.00c.
Lead, wide	9.75c.
Seamless Tubes—	
Brass	25.12 1/2c.
Copper	26.00c.
Brazed Brass Tubes	26.75c.
Brass Rods	16.50c.

ers are satisfactory. Ore at Joplin on Saturday was quoted at \$36, an advance of \$1 per ton, with production last week at least 12,000 tons and sales about 9150 tons. Stocks are still large at close to 63,000 tons.

Nickel.—Wholesale lots of ingot nickel are quoted at 35c., with shot nickel at 36c., and electrolytic nickel at 37c. per lb.

Antimony.—Several carloads have been sold in the last week, but prices are practically unchanged, with Chinese metal for spot delivery quoted at 10.25c., and futures at 10.37 1/2c., New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 23.90c. per lb. delivered.

Non-Ferrous Metals at Chicago

CHICAGO, March 6.—This market is quiet and buyers are resisting present prices. Quotations of tin and lead are lower. The old metal market is without feature.

Prices, per lb., in carload lots: Lake copper, 14.25c.; tin, 53.25c.; lead, 5.85c.; zinc, 5.60c.; in less-than-carload lots, antimony, 12.50c. On old metals we quote copper wire, crucible shapes and copper clips, 10.50c.; copper bottoms, 9.50c.; red brass, 9.25c.; yellow brass, 7c.; lead pipe, 4.75c.; zinc, 3.25c.; pewter, No. 1, 30c.; tin foil, 36c.; block tin, 45c.; aluminum, 11.75c.; all being dealers' prices for less-than-carload lots.

REINFORCING STEEL

New Projects Will Require 8200 Tons— 5400 Tons in Awards

WITH a manufacturing building at Winston-Salem, N. C., and a pier at San Francisco requiring 2800 and 1950 tons respectively, new projects brought out during the week amounted to 8200 tons. Awards totaled 5400 tons, the largest of which was 1600 tons for a cold storage building in Chicago. Awards follow:

BALTIMORE, 300 tons of rail steel bars, barracks at Camp Meade, to Dietrich Brothers.

PHILADELPHIA, 750 tons, Blum Store, to Concrete Steel Co. CHICAGO, 300 tons of rail steel bars, apartment building at 73 East Elm Street, to Calumet Steel Co.

CHICAGO, 400 tons, Civic Opera Building, to American System of Reinforcing.

CHICAGO, 1600 tons, cold storage building, reported to have been awarded to Kalman Steel Co.

CHICAGO, 180 tons of rail steel bars, apartment building at 917 Eastwood Avenue, to Inland Steel Co.

CHICAGO, 270 tons of rail steel bars, Lincoln Hotel, to Calumet Steel Co.

CHICAGO, 200 tons of rail steel bars for two apartment buildings, to Olney J. Dean & Co.

STATE OF IOWA, 700 tons, road work, to unnamed bidder.

STATE OF WISCONSIN, 350 tons, road work, to unnamed bidder.

ELLENBURG, WASH., 118 tons, Kittitas diversion dam; C. F. Graff, Seattle, low bidder.

OAKLAND, CAL., 100 tons, Legion Memorial building, to unnamed San Francisco jobber.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

BURLINGTON, VT., 125 tons, bridge.

NEW YORK, 1000 tons, Eletó warehouse; White Construction Co., general contractor. Previously reported as 500 tons.

NEW YORK, 500 tons, anchorage and abutment towers for Hudson River Bridge; Arthur McMullen Co., low bidder on general contract.

Old Metals, Per Lb., New York

The buying prices represent what large dealers are paying for miscellaneous lots from the smaller accumulators and the selling prices are those charged consumers after the metal has been properly prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, heavy crucible	12.00c.	13.50c.
Copper, heavy and wire	11.75c.	12.875c.
Copper, light and bottoms ..	10.00c.	11.25c.
Brass, heavy	7.00c.	8.50c.
Brass, light	6.00c.	7.50c.
Heavy machine composition ..	9.50c.	10.625c.
No. 1 yellow brass turnings ..	7.75c.	9.00c.
No. 1 red brass or composition turnings	8.75c.	9.75c.
Lead, heavy	5.00c.	5.50c.
Lead, tea	4.00c.	4.50c.
Zinc	3.50c.	4.00c.
Sheet aluminum	12.50c.	14.50c.
Cast aluminum	12.50c.	14.50c.

PHILADELPHIA, 275 tons, public school at Sixth and Buttonwood Streets, bids in.

CUMBERLAND, MD., 160 tons, hospital building, bids in.

WINSTON-SALEM, N. C., 2800 tons, building for Reynolds Tobacco Co.; general contractor, James Baird, Washington.

AUSTIN, ILL., tonnage being estimated, high school.

CHICAGO, 277 tons, superstructure for Women's Athletic Club; Phillip E. Maher, architect.

CHICAGO, tonnage not stated, 20-story office building at 301 West Jackson Boulevard; A. S. Alschuler, architect.

CHICAGO, tonnage being estimated, Ogden National Bank Building; K. M. Vitzthum, architect.

CHICAGO, tonnage not stated, Roosevelt State Bank; Emil Miska, architect.

CHICAGO, 1000 tons, printing plant for R. R. Donnelly Co.; Howard Shaw and Associates, architects.

CHICAGO, 100 tons, Chicago Sanitarium; W. C. Wallace, architect.

CHICAGO, 100 tons, Oscar Wolff office building.

WEST PULLMAN, ILL., tonnage being estimated, building for Columbia Mills, Inc.; Lockwood, Greene & Co., engineers.

ST. LOUIS, 400 tons, track construction work for Missouri Pacific Railway between Allenton and Boles, Mo.

SAN FRANCISCO, 1950 tons, Pier 48; Healy-Tibbets Construction Co., low bidder.

RAILROAD EQUIPMENT

Orders for 400 Box Cars and 300 Refrigerators— Canadian National Will Buy 55 Passenger Cars

PURCHASES of 400 box cars by the Minneapolis, St. Paul & Sault Ste. Marie and of 300 refrigerator cars by Wilson & Co., packers, were the outstanding transactions in the equipment market in the last week. The Canadian National is inquiring for 55 passenger cars. Details of the week's business follow:

Western Union Telegraph Co. is inquiring for five steel underframes and trucks for box cars.

American Smelting & Refining Co. has ordered 60 30-ton gondola ore cars from Koppel Industrial Car & Equipment Co. for shipment to Newfoundland.

St. Louis-San Francisco has ordered six air-dump cars from Magor Car Corporation, and is in the market for 15 baggage cars.

Canadian National has issued inquiry for 55 passenger cars.

Northern Pacific is inquiring for four gas-electric rail motor cars.

Boston & Maine has made inquiry for 10 combination baggage and mail cars.

Missouri-Kansas-Texas is inquiring for eight combination mail and baggage cars.

Minneapolis, St. Paul & Sault Ste. Marie has ordered 200 box cars from Pullman Car & Mfg. Corporation, and a like number from Siems-Stembel Co.

Wilson & Co. have ordered 300 refrigerator cars from Bettendorf Co.

Akron, Canton & Youngstown is in the market for two Mikado type locomotives.

Southern Pacific will buy three Pacific type locomotives and either 21 Southern Pacific type or 17 Mallet type locomotives.

Chicago, Burlington & Quincy has ordered six baggage and three passenger baggage cars from Pullman Car & Mfg. Corporation.

FABRICATED STRUCTURAL STEEL

Awards of 45,000 Tons—40,000 Tons in New Work Under Negotiation

AWARDS of 45,000 tons in the last week were widely distributed in a number of fair-sized projects, the largest of which were a loft building in New York requiring 5200 tons, a building in Pittsburgh of 5000 tons and a club in Chicago which took 4500 tons. Including 5000 tons for a section of the subway in New York, 4800 tons for 41 Mississippi River barges and 4000 tons for a department store in Oakland, Cal., inquiries amounted to 40,000 tons. Awards follow:

BOSTON & MAINE RAILROAD, 1700 tons, 13 small bridges, to Phoenix Bridge Co.

BRIDGEPORT, CONN., 800 tons, department store, to Shoemaker Bridge Co.

NEW YORK, 5200 tons, Lefcourt Building at Seventh Avenue and Twenty-sixth Street, to Levering & Garrigues Co.

NEW YORK, 4000 tons, State Office Building, to A. E. Norton, Inc.

NEW YORK, 2300 tons, loft building at 235-247 East Forty-fifth Street, to Hay Foundry & Iron Works.

NEW YORK, 1800 tons, Kent Automatic Parking Garage at 209 East Forty-third Street, to Post & McCord.

NEW YORK, 400 tons, section 6 of Tudor City, to Harris Structural Steel Co.

NEW YORK, 400 tons, transfer bridge in Bronx, to American Bridge Co.

ALBANY, N. Y., 700 tons, law school building, to McClintic-Marshall Co.

BURLINGTON, N. J., 190 tons, pattern storage building, to American Bridge Co.

PHILADELPHIA, 480 tons, column cores and plate girders for Blum store, to American Bridge Co.

PHILADELPHIA, 700 tons, bridge for Pennsylvania Railroad, to Bethlehem Steel Co.

READING RAILROAD, 150 tons, bridges, to Shoemaker Bridge Co.

HOPEWELL, VA., 100 tons, 150,000-gal. gas tank for Atmospheric Nitrogen Corporation, to Stacey Mfg. Co.

CHARLESTON, S. C., 175 tons, work for Port Authority, to Virginia Bridge & Iron Co.

BIRMINGHAM, 100 tons, National Cast Iron Pipe Co. plant addition, to Virginia Bridge & Iron Co.

BIRMINGHAM, 150 tons, Strowd-Holcombe Cotton Mills addition, to Ingalls Iron Works Co.

COLUMBUS, OHIO, 470 tons, 120 tons for chemistry building and 350 tons for power house for Ohio State University, to Massillon Bridge & Structural Co.

YOUNGSTOWN, 500 tons, furnace bindings for Youngstown Sheet & Tube Co., to Pittsburgh Bridge & Iron Co.

PITTSBURGH, 5000 tons, building for Pittsburgh Plate Glass Co., to McClintic-Marshall Co.

PITTSBURGH, 1450 tons, municipal boulevard extension and viaduct, to McClintic-Marshall Co.

BUFFALO, 150 tons, plant building for Wickwire-Spencer Steel Co., Inc., to Lackawanna Steel Construction Co.

KENMORE, N. Y., 550 tons, high school, to R. S. McMannus Steel Construction Co.

DETROIT, 625 tons, transmission towers for Detroit Edison Co., to American Bridge Co.

CHICAGO, 250 tons, Women's Athletic Club building, to Mississippi Valley Structural Steel Co.

CHICAGO, 4500 tons, Steuben Club building, to Gage Structural Steel Co., local.

MISSOURI-KANSAS-TEXAS RAILROAD, 500 tons, bridges, distributed among three fabricators.

CHICAGO, 3000 tons, office building at Michigan Avenue and South Water Street, to American Bridge Co.

OTTAWA, ILL., 2500 tons, building for National Plate Glass Co., to unnamed bidder.

GRANITE CITY, ILL., 1200 tons, 2,000,000-cu. ft. gas holder for Illinois Power & Light Co., to Stacey Mfg. Co.

ST. LOUIS, 200 tons, southern approach to municipal bridge across Mississippi River, to Mississippi Valley Structural Steel Co.

TACOMA, WASH., 1015 tons, plates, 32 and 48-in. pipe line for city, to Birchfield Boiler Works.

SEATTLE, WASH., 100 tons, crane girders for Pacific Coast Steel Co., to Wallace Bridge & Structural Steel Co.

MILTON, ORE., 625 tons, plates, pipe line and penstock for city, to King Brothers Boiler Works.

LOS ANGELES, 1200 tons, plates, penstock for Southern California Edison Co.; 800 tons to Western Pipe & Steel Co. and 400 tons to Lacy Mfg. Co.

SAN DIEGO, 800 tons, power house for San Diego Consolidated Gas & Electric Co., to McClintic-Marshall Co.

BERKELEY, CAL., 480 tons, addition to Heinz plant, to Judson-Pacific Co.

SAN FRANCISCO, 150 tons, apartment building, Pacific and Laguna Streets, to Western Iron Works.

SAN FRANCISCO, 160 tons, apartment building, Fell and Buchanan Streets, to Golden Gate Iron Works.

SANTA ANA, 100 tons, water tank tower for city, to Llewellyn Iron Works.

SANTA ANA, 275 tons plates, tank for city, to Llewellyn Iron Works.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

STATE OF VERMONT, 715 tons; highway bridges at Montpelier, Sharon, West Hartford, Richmond and Richmond Village.

BOSTON, 200 tons columns, Sears, Roebuck & Co. warehouse.

NEW YORK, 5000 tons, section of subway in Bronx; bids in.

NEW YORK, 2250 tons, anchorage and tower foundations for Hudson River Bridge; Arthur McMullen Co., low bidder on general contract.

JAMAICA, N. Y., 500 tons, Church of the Immaculate Conception.

ORANGE, N. J., 250 tons, substation for Public Service Corporation.

KINGSTON, PA., 500 tons, Memorial Hospital.

WASHINGTON, 600 tons, seaplane hangars for Government at various locations.

GREAT BRIDGE, VA., 200 tons, highway bridge for Virginia State Highway Department.

LAUREL, MD., 1600 tons, grandstand for race track, bids in.

CLEVELAND, 1000 tons, Main Street lift bridge.

BAY CITY, MICH., 1600 tons, building for Chevrolet Motor Co.

BUFFALO, 300 tons, three Erie County bridges.

STATE OF NEW YORK, 600 tons, four bridges for State Highway Department.

DAYTON, OHIO, 250 tons, Municipal Art Institute.

DAYTON, OHIO, 200 tons, building for Young Women's Christian Association.

MEMPHIS, TENN., 4800 tons, 41 barges for Mississippi River Commission; American Bridge Co., low bidder.

CHICAGO, 500 tons, warehouse for Illinois Central Railroad.

CHICAGO & NORTH WESTERN RAILROAD, 6000 tons, bridges.

DETROIT, 2500 tons, building for National Plate Glass Co.

SHREVEPORT, LA., 450 tons, viaduct; Wisconsin Bridge & Iron Co., low bidder.

CHICAGO, 200 tons, auditorium and natatorium in Holden Park.

CHICAGO, 220 tons, apartment building at 3216 North Sheridan Road.

CHICAGO, 360 tons, apartment building at 3270 North Sheridan Road.

MINNEAPOLIS, 1600 tons, Medical Arts Building.

MINNEAPOLIS, 1500 tons, auditorium for University of Minnesota.

SHAWANO, WIS., 675 tons, State highway bridge over Wolf River; Wausau Iron Works, Wausau, Wis., low bidder at \$157,342.

MARINETTE, WIS., 350 tons, new interstate bridge; bids about March 20, Klug & Smith, Milwaukee, engineers.

SAUKVILLE, WIS., 150 tons, State highway span over Milwaukee River; bids about March 19.

DES MOINES, IOWA, 700 tons, United States Court House.

ST. LOUIS, 500 tons, Knights of Pythias building.

SAN FRANCISCO, 3000 tons, Coyote Point bridge across San Francisco bay; bids being taken.

SAN FRANCISCO, 225 tons, sheet piling, Esplanade seawall; Healy-Tibbets Construction Co., low bidder.

SOUTH SAN FRANCISCO, 370 tons, plant for E. H. Edwards Wire Rope Co.; bids in.

OAKLAND, CAL., 4000 tons, Capwell's Department Store; bids in next week.

SAN FRANCISCO, 100 tons, Weinstein Department Store addition; bids next week.

SACRAMENTO, CAL., 225 tons, theater; bids being taken.

KELOGG, ORE., 280 tons, bridge over Umpqua River; bids March 8.

ELLENSBURG, WASH., 155 tons, Kittitas diversion dam; general contract to C. F. Graff, Seattle.

PERSONAL

William B. Updegraff, for 15 years engaged in engineering and sales work for the Watson-Stillman Co., 75 West Street, New York, manufacturer of hydraulic machinery, has been elected vice-president in charge of sales of that company. He is a graduate of Harvard University and a member of the Harvard Engineering Society and of the American Society of Mechanical Engineers.

William J. Chapin, formerly combustion engineer for the Peoples Gas Light & Coke Co., Chicago, and more recently engineer with the Eclipse Fuel Engineering Co., Rockford, Ill., has become identified with the Chicago Steel Foundry Co., Chicago, and will have charge of engineering and sales of PyraSteel, a heat-resisting alloy manufactured by that company.

W. S. Carson, formerly in the Cleveland office of Joseph T. Ryerson & Son, Inc., has been placed in charge of a new district sales office opened by the Globe Steel Tubes Co., Milwaukee, at 1436 Engineers National Bank Building, Cleveland.

D. K. Swartwout, Sr., president Swartwout Co., Cleveland, accompanied by Mrs. Swartwout, sailed on March 3 for a vacation of several weeks in the West Indies.

Joseph B. Montgomery, Jr., who has been assistant to the president of the Berger Division, Central Alloy Steel Corporation, Canton, Ohio, has been elected vice-president and a director of the division. Other officers have been reelected.

Edward H. Ingram, recently associated with the Landis Tool Co., Waynesboro, Pa., has been appointed general superintendent and works manager of the Automatic Nut-Thread Corporation, 3617 North Eighth Street, Philadelphia, manufacturer of automatic nut tapping machines.

F. E. Burgess, secretary and assistant treasurer of the Burgess-Norton Mfg. Co., Geneva, Ill., manufacturer of screw machine products, sheet metal stampings, piston pins and automotive replacement parts, has been elected vice-president and assistant treasurer of the company. W. D. Smith, auditor, has been made secretary. C. M. Burgess, president and treasurer, has been reelected.

Norman W. Foy, in charge of sales at Boston for the Republic Iron & Steel Co., has been appointed district sales manager at Birmingham for that company. He succeeds E. M. Barnes, who has been made manager of pig iron sales, with headquarters at Birmingham. The company's Boston office will continue to function as a branch of the New York sales office, which is in charge of W. H. Oliver.

O. C. Hoffman, president United States Can Co., Norwood, Ohio, was elected a director of the Continental Can Co., New York, at a recent meeting of the latter company's stockholders. I. W. England, president Passaic Metal Ware Co., Passaic, N. J., was also elected a director of the Continental company, succeeding T. R. Morgan, resigned. At the same meeting stockholders approved the purchase of the entire outstanding stock of the Passaic company and of the Seattle-Astoria Iron Works, Seattle, Wash. Acquisition of the United States Can Co. by the Continental organization was consummated a few weeks ago.

John J. Malloy and Ludwig Saudenmeir, designers in the plant of the National Lamp Works, Cleveland, have received the Charles A. Coffin Foundation Awards for 1927. The award came to Mr. Malloy for the designing and building of a basing and soldering machine for miniature incandescent lamps, and to Mr. Sauden-

meir for a new type of combination stem and inserting machine for lamps. The Charles A. Coffin Foundation was established in 1922 by the General Electric Co. as an expression of appreciation of Mr. Coffin's work for the company and the industry as a whole, and the awards are made yearly to men who contribute the most to the efficiency of the company or to the progress of the electrical industry.

J. I. Andrews, vice-president and general manager of sales for the American Sheet & Tin Plate Co., accompanied by Mrs. Andrews, sailed this week for an extended European tour. Fred M. Fuller, assistant general manager of sales, will be in charge of the department until Mr. Andrews returns about the middle of June.

George R. Bennett, formerly vice-president and general manager Edgar Allen Steel Co., Inc., New York, has joined the Braeburn Alloy Steel Corporation, Braeburn, Pa., as assistant district manager at the Chicago branch, 223 North Desplaines Street. A. J. Coursen has become associated with the Braeburn corporation as special representative with headquarters in Chicago. He was formerly assistant sales manager of the Edgar Allen company.

Merrill P. Wolfe, Praetorian Building, Dallas, Tex., has been appointed sales representative of the Pennsylvania Pump & Compressor Co., Easton, Pa., in the Dallas territory.

James Otis Handy, director of chemical and metallurgical investigators for the Pittsburgh Testing Laboratory, now has his office at 72 Washington Street, New York.

B. S. Livingston, vice-president Foreign Traders Co., 17 Battery Place, New York, will leave March 10 on the Columbus for a short business trip to Germany, Belgium and Denmark.

D. F. Geissinger has been appointed direct factory representative in western Pennsylvania, with headquarters at 602 Oliver Building, Pittsburgh, of the Metal Saw & Machine Co., Inc., Springfield, Mass.

Myron F. Westover, for 34 years secretary of the General Electric Co., Schenectady, N. Y., retired on March 1, and has been succeeded by William W. Trench, who has been assistant secretary. Mr. Westover has been actively identified with the electrical industry for 40 years, his first position having been secretary to the late Charles A. Coffin, at that time treasurer and manager of the Thomson-Houston Electric Co., now the West Lynn, Mass., plant of the General Electric Co. The new secretary, a member of the New York bar, is a graduate of St. Lawrence University, Canton, N. Y., and of the Brooklyn Law School, Brooklyn.

T. F. Scannell, formerly associated with the Chain-Belt Co., Milwaukee, has been appointed exclusive representative at St. Louis for the Magnetic Mfg. Co., Milwaukee, manufacturer of magnetic separation equipment. His office will be at 502 Ambassador Building.

W. R. Bean, vice-president Grindle Fuel Equipment Co., Harvey, Ill., will speak on the "Relation of Melting Furnace Operation to Cost and Quality of Malleable Castings" at a meeting of the Quad City Foundrymen's Association, to be held at the Davenport, Iowa, Chamber of Commerce on March 19.

E. D. Hill has established headquarters at 42 Church Street, New Haven, Conn., as representative of the Allis-Chalmers Mfg. Co., Milwaukee. Sales will be under the direction of A. F. Rolf, manager of the company's New York office.

William G. Clyde, president Carnegie Steel Co., Pittsburgh, is back at his desk after a six weeks' stay in California.

W. W. Nichols, vice-president and mechanical engineer of D. P. Brown & Co., 1440 Park Place, Detroit, has recently had conferred upon him membership in the Masaryk Academy of Work, of Prague, Czechoslovakia. Mr. Nichols previously had been admitted to membership in the Institute of Scientific Management, Warsaw, Poland.

H. B. Hirsh, president Belmont Iron Works, Philadelphia, has been appointed first vice-president of the American Institute of Steel Construction. He has been a director of the institute for a number of years. His term of office expires in the fall of 1928.

Gordon E. McNamee, for seven years Milwaukee representative for Briggs & Turivas, Chicago, has organized the G. E. McNamee Co., with offices at 425 East Water Street, Milwaukee, and will handle iron and steel scrap and other iron and steel products.

A. L. Roberts, formerly with the railroad sales department of the Central Alloy Steel Corporation, Massillon, Ohio, has joined the development and research department of the International Nickel Co., Inc., New York, and will devote his time to railroad development work.

Earl H. McCarty, for the past six years general sales manager of the Nash Motors Co., Kenosha, Wis., has been elected a vice-president of the company, continuing in general charge of merchandising.

C. E. MacQuigg, manager Union Carbide and Carbon Research Laboratories, Long Island City, N. Y., will address the New Haven chapter of the American Society for Steel Treating, Thursday evening, March 8, his subject being "Some Present Trends in Engineering Steels."

George H. Cleaver, for 21 years connected with the Oswego Tool Works, Oswego, N. Y., has resigned to become treasurer of the Dime Building and Loan Association in that city.

Isaac Black has been made vice-president and manager of the Russell & Erwin Division, American Hardware Corporation, New Britain, Conn., succeeding the late B. A. Hawley.

Malcolm Farmer, vice-president of the Stanley Works, Bridgeport, Conn., spoke recently before the Worcester Exchange Club, Worcester, Mass.

Robert W. Adams, formerly manager of sales at the Providence office of the General Electric Co., has been made manager of the public utility division in Northeastern United States with offices at 83 State Street, Boston.

Robert E. Clingan has been made assistant to Lester G. Sigourney, secretary and sales manager New Departure Mfg. Co., Bristol, Conn.

Phillip S. Graver, president of the Graver Corporation, East Chicago, Ind., manufacturer of steel tanks, has been elected a member of the South Park Board, Chicago, succeeding Bernard E. Sunny, chairman of the board of the Illinois Bell Telephone Co.

E. W. Kempton, educational director of the American Steel & Wire Co., gave an illustrated talk on steel manufacturing on Feb. 21, at a dinner meeting of the Western Michigan Purchasing Agents' Association at the Rowe Hotel, Grand Rapids, Mich.

William J. Lavelle has resigned as sales manager of the New England Coal & Coke Co. He had been associated with the company about 20 years. Robert P. Tibolt, who has been with the company eight years, succeeds Mr. Lavelle.

V. C. Voight, formerly in the Pittsburgh office of Briggs & Turivas, has joined the sales department of Erman, Howell & Co., McCormick Building, Chicago, dealers in iron and steel scrap.

E. M. Adams, first vice-president and general sales manager of the Inland Steel Co., Chicago, returned March 7 from a four weeks' pleasure trip in California and the Hawaiian Islands.

Wilbur C. Otis, for 13 years associated with the Otis Elevator Co. at Quincy, Ill., has been transferred to the efficiency engineering department of the company at Yonkers, N. Y., factory.

New High-Speed Steel Developed for Cutting Manganese Steel

A new high-speed steel, claimed to be capable of machining manganese steel, has been placed upon the market. For some time tests have been conducted by the Firth-Sterling Steel Co., McKeesport, Pa., on a new type of high-speed steel, which has been designated "Circle C." While the experiments on this steel were being conducted, it was discovered that the capacity of the steel was such that standard test bars were not of a sufficiently rigorous nature to measure this capacity. It was, therefore, decided to use manganese steel in the tests.

The test bars used in testing the new high-speed steel were 3-in. diameter, rolled manganese steel, containing about 12 per cent manganese and 1.20 per cent carbon. The cutting test is reported to have been unusual. Using a test bar that was supposedly unmachinable, the accustomed "break-down" process was not attempted. Instead, all effort was directed to prevent tool failure, according to the statement of one of the company's engineers. The object of the test was to demonstrate that manganese steel can be machined on a commercial scale. The operating conditions and the details of the tests are reported to have been as follows:

The tests were carried on under circumstances that would obtain in almost any ordinary machine shop. The lathe used was a 24-in. back-gear, cone-pulley, belt-driven and gear-feed machine in fair condition. The lathe tools were forged from $\frac{1}{2} \times 1\frac{1}{4}$ -in. Circle C steel. In form these tools were similar to those used on heavy duty work and in many cutting tests, with a front and side clearance of between 6 and 8 deg., a top back rake or clearance of 8 deg. and a top side rake or angle of 14 deg. The nose had a radius of $\frac{1}{8}$ -in. (half the width of the tool). Cutting edge was on the center line of the work.

During the progress of the tests, cutting speeds ranging from $7\frac{1}{2}$ to 28 ft. per minute were tried. It was found that the range from $7\frac{1}{2}$ to 15 ft. per minute gave the best results. When suitable cutting speeds were established, various depths of cuts and feeds were tried. Within the speed range mentioned above, the tools stood up satisfactorily on feeds ranging from 1/60 to 1/50 in., taking cuts from $\frac{1}{16}$ to $\frac{1}{8}$ in.

The chip formed was a very tight and compactly curled ribbon, in color deep dark blue or the brownish gunmetal peculiar to manganese steel. This chip was oily smooth on the under side and would break only when it became entangled. Five to 10 min. before the tool was ready to be taken out for regrinding, the chip would begin to straighten out into a long wavy ribbon which, under an electric light, would show a dull red color 3 or 4 in. from the cut.

At no time during the test were the tools allowed to fail completely. At the first sign of failure they were removed and reground to carry on with further tests. When this stage of failure was reached the cutting edge was slightly rounded, and at a small spot a concentrated erosion and discoloration was evident.

The great pressure against the cutting edge suggested that the work might push the tool away on fine cuts. To determine this point, the tool was set to take a cut 1/64 in. deep, which it would hold accurately and without difficulty across the entire length of the test bar, indicating that manganese steel can be machined to close size limits.

Concerning the heat treatment of this new high-speed steel, the statement is made that this does not differ radically in procedure from that of other high-speed steels, except that it requires a distinct increase in the heats used.

OBITUARY

HENRY PHELPS HOWLAND, superintendent of blast furnaces for the Wisconsin Steel Co., South Chicago, whose death in Boston on Feb. 24 was mentioned in



H. P. HOWLAND

THE IRON AGE last week, was widely known among blast furnace and coke oven operators. He was born at Marion, Mass., April 23, 1878, and later removed to Springfield, Mo., where he was graduated from Drury College in 1898. After two years of railroad work in the Southwest he entered the University of Wisconsin, receiving his degree in mechanical engineering from that institution in 1903. He entered the steel industry at the South works of the Illinois Steel Co., and the following year was transferred to the Joliet works. In 1905 he returned to Chicago to become superintendent of the

old Union works at Thirty-first Street and the Chicago River. Late in 1907 he was transferred to the South works as assistant superintendent of blast furnaces, but in 1909 he left the Illinois company to become head of the blast furnace department of the Wisconsin Steel Co. In 1915 and 1916 he established new records for coke consumption on No. 1 furnace at that plant, making iron on less than 1700 lb. of coke per ton, and in April, 1915, he established a record of 1588 lb. per ton of iron on the same furnace. He also established a new record for production on one lining. This record was made on No. 2 furnace between September, 1915, and May, 1922, when the stack produced 1,332,665 tons of iron and was in blast continuously during the period. Besides effecting economies in production and in coke consumption and playing a prominent part in the development of blast furnace construction, he contributed to the science such papers as a "Discussion of Modern Methods of Burning Blast Furnace Gas in Stoves and Boilers," read before the American Iron and Steel Institute in 1915, and "Calculations With Reference to the Use of Carbon in Modern American Blast Furnaces," read before the American Institute of Mining and Metallurgical Engineers in 1916. Mr. Howland was one of the founders and charter members of the Blast Furnace and Coke Association of the Chicago District, organized in 1916. He served as a director of this organization during 1916, 1919 and 1920, and as vice-president and president respectively during 1917 and 1918. In March, 1917, in collaboration with Walter Mathesius, he presented a discussion before this organization of "Hot Dry vs. Cold Wet Gas Cleaning."

ARTHUR W. FOX, vice-president and general manager Billings & Spencer Co., Hartford, Conn., died at the Hartford Hospital on March 1, following an illness of three months. He was 46 years of age and began his business career with the Johns-Pratt Co., Hartford. He was successively advanced to factory manager of the company, and, following the death of its president, E. B. Hatch, was made vice-president and general manager. When the company became a part of the Colt's Patent Fire Arms Mfg. Co. in 1922 he retained his position with the Johns-Pratt organization and was responsible for the transfer of the plant to a site adjoining the Colt factories. He went to the Billings & Spencer Co. in 1924 as vice-president and general manager to assist in the reorganization and development of the company.

WILLIAM W. HANLON, general superintendent of the Granite City Steel Co., Granite City, Ill., died recently

at his home in St. Louis, aged 70 years. He also was vice-president of the Granite City National Bank and president of the Western Fire Brick Co., Granite City. He entered the steel business at Pittsburgh, and in 1895 moved to Granite City, where he became assistant superintendent of the National Enameling & Stamping Co., later the Granite City Steel Co. Two years later he became general superintendent.

FRANK A. TYLER, for the past 10 years president and treasurer of the J. C. Metcalf Machinery Co., Inc., Boston, died at his home in Lynn, Mass., Feb. 28, aged 59 years.

JOHN BOGENBERGER, a former president of the Consolidated Sheet Metal Works, Milwaukee, died suddenly on Feb. 25, aged 60 years. He was widely known for his development of hollow metal window frames and other fireproofing products for industrial and commercial buildings. In recent years he had been associated with the Biersach & Niedermeyer Co., Milwaukee, and was a past president of the Wisconsin Sheet Metal Contractors' Association.

ORLANDO J. ROOT, in recent years associated with the Standard Calorimeter Co., East Moline, Ill., and a pioneer in the automotive industry of this country, died suddenly on Feb. 16 at his home at Moline, Ill. He was born at West Bay City, Mich., in 1869 and was graduated in mechanical engineering from the Michigan State Agricultural College, Lansing. He then became associated with William G. Vandervoort in the manufacture of gas engines at Champaign, Ill. Later the plant was removed to Moline, where automotive manufacture was begun. During the war the factory was expanded for the manufacture of ammunition, but operations were suspended some years ago.

GEORGE W. HITE, for nine years in the roll sales department of the Pittsburgh Iron & Steel Foundries Co., Pittsburgh, prior to its absorption by the Mackintosh-Hemphill Co., died suddenly at Atlantic City, N. J., March 3. He had lived in that city in recent years on account of his health.

FRANK I. HOOVER, assistant general sales manager Central Iron & Steel Co., Harrisburg, Pa., died of pneumonia, March 3, at his home in Harrisburg.

NEWTON S. CALHOUN, president Johnston & Jennings Co., Cleveland, died at Pasadena, Cal., on March 3, aged 73 years. He was born in Connecticut, was graduated from Brown University, Providence, in 1879, and had lived in Cleveland since 1882. A son, Tracy Jennings Calhoun, is vice-president of the Johnston & Jennings Co.

WILLIAM H. TAYLOR, president Goodwin Car & Mfg. Co., 17 Battery place, New York, died on Feb. 29 at his home in that city, aged 68 years. He had also been prominently identified with a number of coal companies in eastern Pennsylvania.

ERNST BOLEY, assistant to the vice-president in charge of operations of the American Steel & Wire Co., Cleveland, and for years prominently identified with the operating department of that company, died suddenly Feb. 20, aged 66 years. He had been connected with the company since 1884. He was born in Germany and after going to Cleveland was employed in the H. P. nail works of the American Steel & Wire Co., of which his uncle, Michael Baackes, was superintendent. Later he became superintendent of the H. P. works. He then became assistant to the general superintendent of all the American Steel & Wire Co. plants. Later he was made assistant to the vice-president, holding that position until his death. A son, Ernest W., is connected with George W. Prentiss & Co., Holyoke, Mass., wire manufacturers, and another, Herman V., is president of an importing company in Buenos Aires, Argentina.

AIRCRAFT CONSTRUCTION STEEL

Steels and Special Alloys Used to a Greater Extent Than in Any Other Class of Machinery

DATA assembled in the table below are taken from a paper by Edward A. Richardson of Bethlehem, Pa., read before the recent New York meeting of the American Institute of Mining and Metallurgical Engineers. The author states that research to develop metals and methods for aircraft production is warranted, because it has frequently developed light construction later used in many other industries, and to an extent greatly in excess of anything that might be expected of aeronautics for many years to come.

"It is obvious that materials meeting the specialized demands of such light and strong structures as aircraft would, if sufficiently cheap in the fabricated condition, greatly modify methods in many fields. It is not inconceivable that all-metal house construction, for instance, might be rendered economically, esthetically and comfortably desirable if we could provide a 'board' of light metal, insulated and sound-proofed, resistant to corrosion, designed for ease of attachment to a metal frame and for ease of cutting (by special equipment, if necessary), and capable of architectural treatment."

Common Practice in Aircraft Manufacture		
Part	Detail	Material
Wings	Beams	Wood
	Drag trussing	Stream-line wires ?
	Drag struts	Wood
	Leading edge	Thin sheet duralumin
Tails	Fittings	S.A.E. 1020 sheets (a)
	Frame	Drawn steel tubing (S.A.E. 1010 or 1020) bent and welded
	Ribs	Thin sheet steel, flanged
Fuselage	Frame	Steel tubing, S.A.E. 1010, 1020, or alloy (b)
	Engine cover	Aluminum sheet
	Rear cover	Fabric
	Formers	Wood
Interplane	Struts	Steel or duralumin tubing
	Wires	Streamline; special alloy, possibly S.A.E. 2330 or 3330
Landing gear	Axle tube	S.A.E. 2340 or 3140, at least 200,000 lb. ultimate.
	Struts	Steel tubing, S.A.E. 1020 or alloy (b)
Parts for surface control	Disk wheels	Duralumin
	Low strength	S.A.E. 1025 sheets
	Medium strength	S.A.E. 2330 bars
	High strength	S.A.E. 3315 and 6130 bars
	Elevator tubes	Rarely alloy
	Bolts	S.A.E. 2330
	Gasoline tanks	Welded aluminum sheet

(a) Cut, bent to shape, reinforcements welded on, dip-brazed, normalized, cleaned, electro-galvanized, and enamel baked on.

(b) Carbon, 0.25 to 0.35 per cent; chromium, 0.80 to 1.10 per cent; manganese, 0.40 to 0.60 per cent, molybdenum, 0.15 to 0.25 per cent. Used without heat treatment. Material is air-hardening, so butt-welded joints develop 84 per cent efficiency.

Canadian Rail Mill Practice

During the discussions held by the American Society for Steel Treating at Montreal, Que., during February, W. R. Werther, Algoma Steel Corporation, Sault Ste. Marie, Ont., said that it is necessary for his company to give extreme care to the open-hearth practice to avoid "off" heats, because its mills are not equipped to roll softer or harder steel into marketable shapes. The result is an unusual uniformity in chemical analysis.

Canadian railroads are following the practice originated by the Canadian Pacific Railway of rejecting all A rails. When, in addition to the normal crop, enough additional is taken to make a full-length rail, the discard becomes as great a percentage as is required for high-grade forging billets. To avoid the extra premium which such steel demands, the roads accept the steel which would ordinarily be put into the top rail after it has been rolled into tie plates.

Even after this excessive discard, the stub end cut from the top rail is tested under the drop. If it shows no evidence of seaminess, fissures or segregation, all the rails in that ingot are accepted. If it does, the top rail (which would be the B rail in American practice) is discarded, and its lower end is used for another drop test. If this passes, the rest of the rails are ac-

cepted; otherwise the process is continued until a satisfactory test is found.

In this way every ingot is given an individual fracture test, and only the rails from that ingot are accepted on the basis of that test. This is contrasted with the American plan of testing a few rails from each heat selected at random by the inspector.

Transverse fissures have been reduced by the practice of rolling only from reheated blooms, rather than direct from the hot ingot. In general, the problem to be met when making heavy-section rails is to produce a section free from sizable internal stresses or differences in composition, and possessing a fine-grained, uniform structure which resists wear and yet retains maximum toughness.

Refractory Problems of Electric Steel Foundries

The joint committee on foundry refractories has been active in several different ways recently. At present the subcommittee on survey for the electric steel castings industry is hard at work on the refractory problems of the electric castings foundries. This subcommittee is planning to circulate a questionnaire to all electric steel foundries to obtain additional information to aid them in their studies. They hope that the response to this will be generous. The committee is composed of the following members: Lee Everett, chairman, Illinois Clay Products Co.; J. M. Geopferd, Racine Steel Castings Co.; W. Harvey Payne, Pittsburgh Electric Furnace Co.; P. C. Leonard, General Refractories Co.; Samuel Arnold, Heroult Electric Furnace Co.; H. L. Smalley, Harbison-Walker Co.; A. C. Gierach, American Manganese Steel Co., and F. W. Brooke, William Swindell Brothers.

Paying Employees by Check for Safety

Advantages and disadvantages of check payment of employee wages are outlined in a pamphlet recently issued by the Policyholders' Service Bureau of the Metropolitan Life Insurance Co., New York. The pamphlet is based upon the experience of 50 companies which have lately adopted check payment. Only one of these firms has returned to the cash payroll system. In nearly every case the safety factor has been uppermost in prompting the adoption of check payment. The danger of the cash plan is evidenced by the fact that in a recent six months' period, according to the American Bankers' Association, there were 205 payroll robberies resulting in the loss of \$1,850,000, the wounding of 40 employees and the death of 20.

The United States Steel Corporation, one of the companies which contributed to the survey, has recommended to its subsidiary companies that employees be paid by check. A few companies find check payment not practical, either because cash is preferred by their employees or because there are no banking facilities in the towns where the plants are situated. In such cases payment by check would be expensive and troublesome. Among the important reasons why the Steel Corporation prefers its subsidiaries to pay by check are the following: It reduces hazard to employees while protecting cash; eliminates temptation for theft; eliminates disputes as to amounts received by employees; reduces force and equipment which would be necessary if employees were paid by cash; saves time by making it possible to pay employees at their posts; is more economical, and encourages thrift.

Locomotive Shipments Still Low

WASHINGTON, March 6.—Railroad locomotives to the number of 59 were shipped in February, comparing with 47 in January, according to the Department of Commerce, and unfilled orders at the end of each month were 204 and 222 respectively. With two exceptions, the February shipments were the lowest in more than a year. In February, 1927, the total was 80 locomotives, and 163 were shipped in February, 1926.

Metallic Flow During Rolling

(Continued from page 667)

Conditions shown in Fig. 4c and 4d may be combined to yield the highly complicated condition shown in Fig. 4e. As the crystal rolls out, both twinning and slip undoubtedly occur, the former offering a rational plan for the shift in the crystalline orientation experimentally observed, and the latter providing for most of the plastic thinning of the crystal.

Postulates Advanced by Professor Mathewson

Such a brief account of the principal points in the lecture can do little more than glimpse the experimentation and deductions underlying the following postulates, a series of provisional conclusions, "which may at least stir up an amount of useful discussion":

1. When in the inhomogeneous deformation of a metal by slip combined with distortion, the atoms in certain zones reach positions more nearly approximating equilibrium positions in a possible twin than in the original crystal, twin lamellae will be formed with partial relief of stress and the residual distortion will be distributed in harmony with the geometrical requirements of each special case.
2. By far the great majority of the metals are subject to structural alteration of this character.
3. Under slowly applied loads there is a minimum occurrence of the continuous distortion from plane to plane required to initiate twinning, owing to the tendency toward premature slip along "weak" planes of variable spacing depending upon the concentration of impurities or the operation of other factors which may affect the cohesion between planes.
4. Under impact loading a given small displacement is

momentarily distributed among many planes, and favors the formation of sizable twin bands.

5. The distortion around simple twin bands wholly inclosed within the original crystal may be confined to the ends as distinguished from the parallel sides bounded by twinning planes and this brings about end growth on annealing which may spread along the sides. In other cases distortion may exist at the composition planes and bring about direct lateral growth.

6. Both the quantity and the size of deformational twins are greatly affected by the kinds of deformation and the purity of the metal.

7. Distortion and thermal instability are especially pronounced in the vicinity of faults or direct intersections where twin bands enter into conflict with one another.

8. One form of recrystallization is essentially granulation produced by irregular and competitive growth of interstratified twin lamellae (which may be termed "crystallographic fragments" in that they cannot be fitted together without distortion in spite of their crystallographic relationship through the parent crystal).

9. Recrystallization in the absence of twinning is a similar reaction between lamellae (fragments) formed by inhomogeneous distortion during slip, e.g., variable rotation of the slip planes. This leads to less pronounced changes in orientation from grain to grain than is effected by twinning.

10. In conformity with the conception of recrystallization expressed in (8) and (9), diversity of orientation after a succession of deformational and annealing treatments is due to multiple internal twinning, rotation during slip, or some combination of these two causes depending upon the nature of the metal, the initial orientation of the crystals and the kind of deformation.

Allis-Chalmers Mfg. Co. Buys Monarch Tractor Corporation

The Allis-Chalmers Mfg. Co., Milwaukee, has purchased the entire capital stock of the Monarch Tractor Corporation, Springfield, Ill., and will operate the plant as a subsidiary without immediate changes in personnel. Manufacturing, engineering, purchasing, accounting and sales activities will be coordinated with the Allis-Chalmers organization and arrangements are being made to install additional machinery and equipment to increase the range of production at Springfield.

The Monarch plant consists of assembly and machine shops of modern construction with approximately 75,000 sq. ft. of floor space, and a six-acre tract of land provides for further expansion. The corporation was formed in January, 1926, to succeed the Monarch Tractor Co., with plant at Watertown, Wis. The plant was moved to Springfield and operation begun in May, 1926.

Baldwin Locomotive Works Site in Philadelphia to Be Sold

The Baldwin Locomotive Works, which has gradually been moving its manufacturing facilities from its Philadelphia plant at Broad and Spring Garden Streets, that city, to the new plant at Eddystone, Pa., will have completely vacated the Philadelphia plant by July 1, it is announced, and the property will be offered for sale. Samuel M. Vauclain, president, said that there are no negotiations under way at present for its sale, but in the past year or so there have been various reports as to the use which would ultimately be made of the property, which is centrally located, one being that a group of railroads would use it as a site for a union station. At a meeting of the Baldwin stockholders on March 1 all of the directors were re-elected.

Ottawa Silica Co., Ottawa, Ill., has acquired the plant and property of the United States Silica Co., also at Ottawa. The plant of the United States company will be operated and all trade names of established brands of products will be used. General offices of the new company will be at Ottawa, Ill.

New McWane Cast Iron Pipe Plant Increases Operations

BIRMINGHAM, March 3.—The new 16-ft. pipe unit of the McWane Cast Iron Pipe Co., Birmingham, which began operations Jan. 1, has been pronounced so successful that the plant goes on double-shift early this month. This is in accordance with schedules fixed some time ago when the company announced that the manufacture of sand cast pipe by its new process would be put on a mechanical basis. The originators of this new method of making pipe claim that it promises to be of far-reaching importance.

The McWane mechanical method is said to be both revolutionary and evolutionary. It is termed an adaptation of up-to-date foundry processes and principles to the manufacture of pipe in green sand and follows the plan upon which the foundries of large automobile manufacturers operate.

The McWane method of manufacture differs from the old methods in that heretofore pipe has been cast vertically in pits, the molds and cores being dried before the iron is poured. By the use of a patented device for holding the cores central in the mold, the pipes are cast by this new method while the molds are in a horizontal position without the necessity of drying either the molds or the cores.

A distinct feature is that the operation is continuous. In ordinary foundry practice a certain number of molds is prepared and the iron is subsequently poured into them, which constitutes a day's work.

Another unusual feature is the flexibility of the plant under the process. Instead of a number of sizes of pipe being made each day and the capacity of a given size being limited to the amount of equipment available, the entire unit runs on a given size, as in a rolling mill, until the orders for that size are completed, when the equipment may quickly be changed to make another size. In this way the plant makes what the market demands, rather than having to sell what the plant makes.

Shipments of fire-extinguishing equipment in January included 53 pumping engines and 18 other automobile-type units, compared with 80 and 34 in December, and with 70 and 23 in January, 1927.

British Produce More Foundry Iron

Hematite Make Is Curtailed—Restriction of Tin Plate Output Still Effective—
Japan Places Tin Plate With Welsh Mills

(By Cable)

LONDON, ENGLAND, March 5.

DEMAND for Cleveland pig iron has improved and makers are well booked both for prompt and forward delivery. Consequently output is to be increased by Bolckow, Vaughan & Co., blowing in an additional furnace.

Hematite is dull and makers have agreed to combat competition by regulating production, which has consequently been curtailed by Pease & Partners blowing out one Normanby furnace and Giers, Mills & Co. blowing out their remaining two Ayresome furnaces and closing down entirely, dismissing 360 men. Foreign ore is firmer as a result of the Swedish strike, but buyers are not seeking to make new contracts.

Finished iron and steel is generally quiet for export and plate mills are still in need of tonnage. Domestic

business is unimproved by the recent increase in rebates.

Tin plate inquiry is moderately active, but business is restricted as buyers are hoping makers will accept the schedule price. Sellers are firm at 18s. (\$4.39) per base box, although some business has been done at less. Output is to be restricted by closing the mills for three weeks during a period of 13 weeks beginning March 5.

Galvanized sheets are moderately active in small lots and works are sold out for March in the heavy gages. Black sheets continue quiet.

The Clyde shipbuilding output in February was 16 vessels totaling 61,751 tons. This brings the total for January and February to 117,762 tons.

The Continental market is firm, but British consumers are purchasing no more than is necessary to cover immediate requirements.

EUROPEAN CARTELS WEAK

Division of Markets Has Failed—Overproduction Greater—Rails Only Price-Controlled Product

(Special Correspondence)

HAMBURG, GERMANY, Feb. 25.—There is a great deal of discussion among producers and consumers of iron and steel as to the future of the cartel system. There seems to be considerable misinformation and not a little misunderstanding of the entire cartel structure. If the existing cartels are to be judged by their actual success, they are far from satisfactory. Recently, at a meeting of shareholders of a German steel corporation, the statement was made that existence of cartels had not added a single ton to the production or exports of Germany or other European countries.

Today, the only cartels and syndicates of importance are the International Steel Cartel, which includes all European producers except Great Britain, Italy and

Poland; the Wire Rod Cartel, which includes Germany, France, Belgium and Luxemburg; the International Tube Cartel, which consists of three groups of members, one including France, Belgium, Luxemburg and the Saar, another including Germany and Holland and a third for Poland and Czechoslovakia. The European Rail Makers' Association (E. R. M. A.), of which all European producing countries except Italy and Poland are members, attempts to maintain a minimum base price for rails and to a certain extent has been successful. Most other cartels have little or no influence. The wire, wood screw and wire netting cartels have failed to function and the enamelware association has no influence in its field.

The European Rail Makers' Association, which is one of the most successful of the international syndicates, not only seeks to maintain prices among its members, but a year ago devised a plan for the division of markets to reduce the severity of competition. Under this plan, the markets in British possessions are retained by British mills, those in French colonies are set aside for French producers, and Germany has cer-

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at \$4.87 per £ as follows:

	£0 18s.	to £0 18½s.	\$4.39	to \$4.45
Durham coke, del'd.	1 1½		5.30	
Bilbao Rubio ore*	3 7½		16.44	
Cleveland No. 1 fdy.	3 5		15.83	
Cleveland No. 3 fdy.	3 4		15.59	
Cleveland No. 4 fdy.	3 3½		15.46	
Cleveland basic (nom.)	3 15	to 3 15½	18.27	to 18.39
East Coast mixed...	3 9	to 3 10	16.80	to 17.05
East Coast hematite	3 9½	to 3 10½	16.93	to 17.17
Rails, 60 lb. and up.	7 15	to 8 0	37.75	to 38.96
Billets	6 0	to 6 10	29.22	to 31.66
Ferromanganese	13 10		65.75	
Ferromanganese (export)	13 0	to 13 5	63.31	to 64.53
Sheet and tin plate bars, Welsh	5 7½	to 5 15	26.18	to 28.01
Tin plate, base box.	0 17½	to 0 18½	4.33	to 4.45
Black sheets, Japanese specifications	13 5	to 13 10	64.53	to 65.75
Ship plates	7 12½	to 8 2½	1.66	to 1.77
Boiler plates	9 2½	to 9 12½	1.98	to 2.09
Tees	8 2½	to 8 12½	1.77	to 1.99
Channels	7 7½	to 7 17½	1.60	to 1.71
Beams	7 2½	to 7 12½	1.55	to 1.66
Round bars, ¾ to 3 in.	7 5	to 7 15	1.58	to 1.69
Steel hoops	10 10	to 11 0	2.28	to 2.39
Black sheets, 24 gage	10 0	to 10 5	2.17	to 2.23
Galv. sheets, 24 gage	13 7½	to 13 10	2.91	to 2.94
Cold rolled steel strip, 20 gage, nom.	14 0	to 14 5	3.04	to 3.10

*Ex-ship, Tees, nominal.

Continental Prices, All F. O. B. Channel Ports

	£3 4s.	to £3 5s.	\$15.58	to \$15.83
Foundry pig iron: (a)				
Belgium	3 4	to 3 5	15.58	to 15.83
France	3 4	to 3 5	15.58	to 15.83
Luxemburg	3 4	to 3 5	15.58	to 15.83
Basic pig iron (nom.):				
Belgium	3 0	to 3 1	14.61	to 14.85
France	3 0	to 3 1	14.61	to 14.85
Luxemburg	3 0	to 3 1	14.61	to 14.85
Coke	0 18		4.39	
Billets:				
Belgium	4 13½		22.77	
France	4 13½		22.77	
Merchant bars:				
Belgium	5 7		1.18	
France	5 7		1.18	
Luxemburg	5 7		1.18	
Jolists (beams):				
Belgium	4 17		1.07	
France	4 17		1.07	
Luxemburg	4 17		1.07	
Angles:				
Belgium	5 5		1.16	
½-in. plate:				
Belgium (a)	6 12½		1.46	
Germany (a)	6 12½		1.46	
¾-in. ship plates:				
Belgium	6 7½		1.40	
Luxemburg	6 7½		1.40	
Sheets, heavy:				
Belgium	6 1		1.34	
Germany	6 1		1.34	

(a) Nominal.

tain priority rights in some European and Latin American markets. The Far East was to be allocated to all members on a tonnage basis. This plan of dividing world markets has proved unsuccessful and is understood to have been practically abandoned.

The purpose of all these international syndicates is to maintain prices, eliminate disastrous competition, avoid overproduction and to dispose of surplus output in foreign markets. After long negotiation Poland finally entered the tube cartel, but at the end of last year tube prices were lower than at the end of 1926. Under the regulations of the cartel, France and the Saar may not do business with Scandinavian countries, Germany, Spain or Portugal. Actually, merchants in London, Antwerp or Hamburg can buy as much as they wish from these countries and ship to any foreign markets. The International Steel Cartel has had no influence on prices, and European production of steel last year, instead of being reduced, was far in excess of 1926. Nor has the International cartel reduced competition between member countries. More steel was imported by Germany from France and Belgium in 1927 than in previous years.

While the cartels do not yet exercise much influence on business, it is believed in many quarters that they promise much for the future. If central sales offices are established—and there is a movement in that direction that may meet with success—there will be better distribution of orders and more rigid control of prices and output. Anything like complete success in central selling, however, is not regarded as at all probable.

Japan Buys Tin Plate from Welsh Mills

NEW YORK, March 6.—The total quarterly requirements of the Nippon Oil Co., Tokio, Japan, about 64,000 base boxes of oil can tin plate, has been placed with Welsh mills. It was first offered to American mills at the Welsh price, but was refused. This is the second successive order awarded to Britain by the Nippon Oil Co., which usually purchases a large part of its requirements from American mills. It is claimed by the purchasers that British tin plate has recently been improved in quality so that the American product is not worth a large premium over that of the Welsh mills.

The light-gage black sheet market is quiet, with Japanese merchants buying small lots from British sellers who continue to quote £14 18s. (\$72.57) per ton, c.i.f. Japanese port. Mills in the United States are quoting \$77 per ton, c.i.f. Japan, but buyers believe that this might be shaded slightly on a sizable tonnage.

Some inquiry for rails is appearing from Japanese railroads. The city of Tokio is in the market for about 4 miles of grooved and girder rails, and the Hanshin Electric Railroad, Osaka, will open bids shortly on about 1100 tons of high T-rails.

Disappointment Over Course of Coal Probe

PITTSBURGH, March 2.—Those who had expected that the Senatorial investigation of the soft coal industry in Pennsylvania, West Virginia and Ohio would be a thorough-going examination of the situation, and that all phases of the dispute between operators and the miners' union would be looked into, are disappointed over the course of the probe, which got under way here recently.

The committee has found that there has been suffering, misery and want among union miners and their families as a result of the idleness of the bread-winners, and it has been brought out that one or two coal companies, after signing the union wage scale agreement in Jacksonville in February, 1924, subsequently broke it, but so far nothing has been introduced as to the fundamental causes for the rupture, nor has anything been said that establishes the responsibility for the conditions under which miners and their families have been found to live.

EXPECT MORE JAPANESE BUYING

Merchants Stocks Smaller—Consumers Buying Tin Plate Seconds from Government Steel Works

Total Japanese imports of iron and steel in 1927 were about 715,000 tons, or nearly 30 per cent less than in 1926, says the monthly report of market conditions issued by A. Cameron & Co., Ltd., Kobe, Japan. The Yawata works' low prices and the increased domestic production, in addition to the trade depression, are responsible for the decline. There has also been a considerable falling off in stocks held by merchants. A conservative estimate would place stocks at 30 per cent lower than 12 months ago. So it is reasonable to expect resumption of imports of foreign material before very long, for the Japanese manufacturers cannot supply the entire normal consumption.

The recent decline in the prices of raw cotton has hit the Japanese spinning companies severely. The purchasing power of the nation has declined considerably because of the recent financial panic. A plan to stabilize raw silk prices is working better, and the price of raw silk has advanced slightly due to lower stocks. No spectacular advance is expected, however, in view of the improvement in the manufacture of artificial silk.

Business conditions in China remain chaotic. A revival of trade in China would aid Japanese business materially, and, in turn, an improvement in Japanese conditions would result in heavier imports.

Light-gage black sheets registered a considerable decline in prices in January. It had been expected that the Government would further increase the duty and, in anticipation of this advance, prices became firmer and there was some speculation. When the cabinet was dissolved and there was no further prospect of passage of the tariff bill before next fall, the price situation weakened. In addition, stocks at the Kawasaki Dockyard Co. are being liquidated at reduced prices.

The tin plate market has not been particularly active. There is a growing demand from consumers for tin plate seconds and wasters because of the lower price and the smaller duty. The recent heavy stocks of British 170-lb. boxes of tin plate have been considerably reduced, but there has been no fresh buying, as the Government works at Yawata is selling tin plate seconds of a quality equal to Japanese seconds at a price 2s. 6d. (61c.) per box lower.

Effect of Variables in Foundry Practice

"The most difficult problem of the foundryman can be summed up in the word 'variable,'" said J. Ramsey Speer, president Mackintosh-Hemphill Co., Pittsburgh, before the February meeting of the Pittsburgh Foundrymen's Association. "Taking foundry practice in general, it is hard to conceive of any business where the variables which enter into the daily practice have more to do with success or failure than in the foundry business. Of course, every industry, where metallurgy plays a prominent part, is affected by a great many variables, but somehow or other it seems that the extent of these variables is greater in jobbing foundry practice than in almost any other line.

"There are three things among these 'variables' which stand out as dominating the situation to a greater extent than anything else—gating, heading, venting. Give us the man," said Mr. Speer, "who can gate his castings intelligently; who, when he sees a pattern, knows from his experience and intuition where and how it should be gated; couple this knowledge with the correct conception of how the casting should be headed to insure its being sound in every particular, and add to this the ability to diagnose the problem of venting the casting properly; give us such a man, I say, and he will add several per cent to the yields which we can expect and depend upon. With such yields, the foundryman's problem is more than half solved."

Machinery Exports Less in January

Seven-Month Total 13 Per Cent Ahead of Last Year—

Imports Less Than Year Ago

EXPORTS of machinery of all kinds in January were valued at \$36,183,571, against \$38,169,898 in December, according to figures prepared in the Department of Commerce. For the seven months ended with January they were valued at \$260,552,482, compared with \$229,527,021 for the corresponding period of the previous year. In January, 1927, exports were valued at \$33,447,732.

Imports of all machinery and vehicles in January were valued at \$1,744,604, against \$2,163,001 in January, 1927, and for the six months ended December, 1927 and 1926, they were valued at \$12,185,838 and \$12,683,740, respectively. Imports of machinery listed in THE IRON AGE table were valued in January at \$1,157,964.

Exports of industrial machinery as classified by the division of statistics, Department of Commerce, were valued at \$16,202,582 in January, against \$17,206,531 in December. For the six months ended December, 1927 and 1926, they were valued at \$101,334,260 and \$91,968,259, respectively. Exports of "other industrial machinery" in January were valued at \$5,729,391, against \$5,224,582 in January, 1927, and for the six-month period ended December, 1927 and 1926, they were valued at \$35,932,752 and \$29,431,743, respectively.

Power-driven metal-working machinery to the value of \$2,089,802 was exported in January, against \$1,494,127 in January, 1927. For the six months ended December, 1927, the value was \$11,599,377, compared with

\$7,336,956 during the six months ended December, 1926. Machine tools exported in January, 1928, totaled 686, valued at \$1,315,771, against 623, valued at \$1,215,992, in December.

Industrial, office and printing machinery imported in January were valued at \$1,074,638, against \$1,432,842 in January, 1927. For the six months ended December, 1927 and 1926, the values were \$7,393,794 and \$8,378,896, respectively.

Decline in Immigration

WASHINGTON, March 3.—Immigrant aliens admitted to the United States in December, 1927, totaled 22,350, the lowest number since February, 1927, with a total of 21,695. Departing emigrant aliens in December numbered 9085. During the six months ended Dec. 31 of last year 164,665 immigrant aliens were admitted, as against 159,220 for the first six months and 175,955 during the last half of 1926. Of the December admissions of aliens, 11,933 were quota immigrants, 11,753 coming from Europe, which during the last six months of last year provided 75,394 of the 76,852 quota immigrants. Iron and steel workers admitted in December totaled only 98, while for the six months period the number was 926.

Machinery Exports from the United States

(By Value, in Thousands of Dollars)

	January		Seven Months Ended January	
	1928	1927	1928	1927
Locomotives	\$126	\$1,133	\$1,512	\$3,580
Other steam engines....	70	285	657	1,133
Boilers	75	271	835	1,212
Accessories and parts....	47	33	456	330
Automobile engines....	745	678	4,501	4,965
Other internal combustion engines....	631	585	4,183	5,459
Accessories and parts....	256	345	1,482	2,367
Electric locomotives....	373	17	1,163	1,102
Excavating machinery....	537	325	3,725	2,396
Concrete mixers....	71	111	589	463
Road making machinery....	183	133	1,165	821
Elevators and elevator machinery	366	342	2,770	2,978
Mining and quarrying machinery	1,046	1,136	7,443	7,798
Oil well machinery....	985	1,978	7,875	10,247
Pumps	432	592	4,800	3,631
Bending and power presses	126	106	982	928
Machine tools*.....	1,281	812	7,837	4,384
Forging machinery....	90	106	723	589
Rolling machines....	58	70	310	156
Other metal-working machinery and parts....	449	352	3,180	2,624
Textile machinery....	2,191	2,003	14,538	12,392
Sewing machines....	668	773	4,957	5,099
Shoe machinery....	169	99	842	772
Flour-mill and gristmill machinery	37	47	428	414
Sugar-mill machinery....	182	165	4,677	2,335
Paper and pulp mill machinery	296	586	1,875	2,059
Sawmill machinery....	67	79	478	489
Other woodworking machinery	212	113	1,029	667
Refrigerating and ice-making machinery....	520	514	3,430	3,105
Air compressors.....	355	325	3,251	2,488
Typewriters	1,956	1,651	12,031	9,823
Power laundry machinery	59	80	744	503
Typesetting machines....	462	324	3,051	2,232
Printing presses....	397	471	3,625	3,205
Agricultural machinery and implements....	7,855	4,631	56,353	42,102
All other machinery and parts	12,812	12,177	93,052	84,181
Total	\$36,184	\$33,448	\$260,552	\$229,527

*Principal details are shown in another table.

Exports of Power-Driven Metal-Working Machinery

	January, 1928		December, 1927	
	No.	Value	No.	Value
Engine lathes.....	66	\$157,399	79	\$187,362
Turret lathes.....	26	82,136	31	89,768
Other lathes	57	155,744	39	56,443
Vertical boring mills and chucking machines	7	30,978	26	73,582
Thread-cutting and automatic screw machines	74	88,723	47	42,483
Knee and column type milling machines....	30	69,761	32	76,947
Other milling machines	81	147,290	75	223,241
Gear-cutting machines.	31	91,452	38	105,639
Vertical drilling machines	42	44,430	34	24,551
Radial drilling machines	18	31,519	10	27,129
Other drilling machines	42	76,167	36	25,704
Planers and shapers....	40	62,459	44	57,808
External cylindrical grinding machines...	77	166,151	67	148,073
Internal grinding machines	46	76,359	31	51,379
Metal-working tool-sharpening machines.	49	35,203	34	25,885
Total	686	\$1,315,771	623	\$1,215,992

Imports of Machinery into the United States

(By Value)

	January		Seven Months Ended January	
	1928	1927	1928	1927
Metal-working machine tools.	\$56,628	\$33,570	\$233,392	\$302,923
Agricultural machinery and implements	402,515	336,044	2,245,799	2,049,756
Electrical machinery and apparatus	58,016	75,862	881,730	469,273
Other machinery....	470,409	850,727	3,802,454	5,226,997
Vehicles, except agricultural ...	170,396	151,603	1,637,391	1,336,592
Total	\$1,157,964	\$1,447,806	\$8,800,766	\$9,385,541

Much Higher Tonnage of Iron Ore Imports

January imports of iron ore into the United States are reported by the Department of Commerce at 251,178 gross tons. This represents a gain of more than 90 per cent over the low tonnage that came in in December. It is, however, only moderately above the average month of 1927 and is 15 per cent below the imports in January of that year, at 295,480 tons. For the seven elapsed months of the fiscal year, the incoming movement has been 1,591,139 tons, which is within about 1 per cent of the slightly larger imports of the corresponding period of the preceding year.

Chile maintains a lead in incoming tonnage, having furnished 60 per cent of the total in January, compared with less than 39 per cent a year earlier. French Africa has taken second place, having advanced far ahead of Cuba, which was in second place a year ago. Details are shown in the table.

Sources of American Imports of Iron Ore
(In Gross Tons)

	January		Seven Months Ended January	
	1928	1927	1928	1927
Canada	2,358	338	23,258	12,475
Cuba	14,000	42,000	163,113	322,500
Chile	150,800	110,300	832,100	787,700
Spain			23,246	13,393
Sweden		22,973	148,330	61,657
French Africa.....	63,675	29,900	289,714	182,439
Other countries....	20,345	89,969	111,378	228,817
Total	251,178	295,480	1,591,139	1,608,981

German Iron Ore Imports Principally Swedish

HAMBURG, GERMANY, Feb. 11.—The change in sources of German iron ore supplies since the war is shown in the recently published import totals for 1927. While iron ore imports in the years 1910 to 1913 averaged 5,390,000 tons a year, 17,400,000 tons of iron ore was brought into Germany in 1927, compared with 9,550,000 tons in 1926. Of the 1927 total, Sweden supplied 8,620,000 tons, Spain 3,100,000 tons and France 2,900,000 tons.

German steel works are seeking to obtain their ore supplies from mines owned by them in foreign fields. The large Swedish mine, Aktiebolaget Nya Noragruf-foorna, has been purchased by a combination of Krupp, Hoesch and Gutehoffnungshütte interests.

Molybdenum Output Increased in 1927—Price Reduced

Three companies produced molybdenum ore in the United States during 1927: the Climax Molybdenum Co., at Climax, Colo.; the Molybdenum Corporation of America at Sulphur Gulch, near Questa, N. M.; and the Santo Niño Mining Co. at Helvetia, Ariz., according to data collected by the United States Bureau of Mines. A total of 216,595 net tons of ore was milled, from which concentrates carrying from 75.14 to 95.4 per cent of molybdenum sulphide, MoS₂, equivalent to 2,299,217 lb. of elemental molybdenum, were obtained, an increase of about two-thirds over 1926. Of the concentrates produced 2,286,075 lb., valued at the mines at \$1,858,786, was shipped. Nearly all of the output was made into calcium molybdate, in which form it is added to steel.

Perhaps the most important event of the year in the molybdenum industry was the announcement that the price of metal contained in calcium molybdate would be reduced at the beginning of 1928 from \$1.20 to 95c. per lb. The reasons for the reduction were that the larger sales had allowed mills to be run more nearly at full capacity with consequent lower costs and that the lower prices would probably encourage a still larger use.

Net profits for 1927 of the United States Cast Iron Pipe & Foundry Co. were \$3,373,976, compared with \$5,049,367 in 1926, or a decrease of approximately 33 per cent.

Russian Iron and Steel Output Increased Last Year

WASHINGTON, March 5.—Provisional figures received by the iron and steel division, Department of Commerce, from Assistant Commercial Attaché Daniel J. Reagan, Paris, show that the heavy iron and steel industry of Soviet Russia greatly increased its output during the fiscal year 1926-27. The total output was 2,946,900 tons of pig iron and 3,533,000 tons of steel, increases of 34.9 per cent and 32.3 per cent when compared with the previous year. The figures also show a production of 2,687,100 tons of finished steel, an increase of 20.7 per cent.

Russian siderurgical production was valued at a total of 307,700,000 rubles (approximately \$158,157,000) in 1926-27, an increase of 9.5 per cent over the preceding year. The number of workers increased 10.6 per cent, with a total of 191,154 engaged. In spite of the marked increases reported in the total output, the daily average production per man increased only 1 per cent while the average pay increased 18.40 per cent.

Reduction in Stocks of Industrial Coal

Bituminous coal stocks on Feb. 1, in industries in the United States, are estimated by the National Association of Purchasing Agents at 50,595,000 net tons. There has been a progressive decline from the high figure of last April at about 75,000,000 tons. Present stocks are estimated to constitute an average supply for 42 days, compared with a 40-day supply a year ago. Stocks are about equivalent to those of two years ago, but present consumption is 14 per cent below consumption at that time.

Industrial consumption in January is placed at 37,678,000 net tons. This shows an increase of more than 1 per cent above December and is the largest figure in about a year. The recent low was recorded in September, with 33,195,000 tons. Production of bituminous coal in January is placed at 49,645,000 tons.

Production of bituminous coal in the United States in the week ended Feb. 25 is reported by the Bureau of Mines at 10,181,000 net tons. This is a substantial gain over the production of the two preceding weeks, but it is considerably below the 12,763,000 tons of the corresponding week a year ago.

Steel Furniture and Shelving Orders at Highest Level Ever Reached

Steel furniture orders in January are reported by the United States Department of Commerce at \$3,248,165. This is about 6 per cent higher than the largest month previously reported since these figures have been gathered—that is, since September, 1924. The increase over December was approximately \$400,000, while the gain from January, 1927, was \$361,000. The previous highest figure was that of January, 1926, at \$3,063,833.

Shipments at \$2,712,663 in January were about 1 per cent lower than in December and slightly lower than in the preceding January. They were, however, higher than the average month of either of the two preceding years. Unfilled orders at \$2,000,450 made the highest total ever recorded, being about 1 per cent above the previous high of two years ago. The increase in unfilled orders during the month was \$587,000, or nearly 42 per cent.

New orders for steel shelving made the highest total over recorded, at \$768,748, in January. The gain over December was about \$150,000, while the figure was nearly \$200,000 above that of a year earlier. Shipments of steel shelving were \$680,264, a gain of more than \$100,000 over December, but a figure which was exceeded last March and also in March and April, 1926. Unfilled orders for shelving were \$679,745, the highest total since September.

Oglebay, Norton & Co., Hanna Building, Cleveland, dealers in iron ore, on March 1 opened a department for the sale of coal and coke.

Machinery Markets and News of the Works

MARCH TRADE BETTER

Improved Business in Machine Tools Noted in Some Districts

St. Louis-San Francisco Railroad Issues Orders Against List—Radial Drill Manufacturer Advances Prices

MACHINE tool sales have turned upward, according to reports from some districts, and give promise of reaching a fairly high point this month. A considerable volume of inquiry is pending and fresh inquiries are being received at a good rate.

A feature of the current business is that orders are coming from diversified industries and most frequently are for single machines. Railroads and the automobile companies, which are usually depended upon to take a

large share of the machine tool output, are not conspicuously large buyers.

In the railroad field the principal buying of the week has been done by the St. Louis-San Francisco, which ordered a number of tools against a recent inquiry. The Chicago, Burlington & Quincy is getting prices on several tools. The New York Central, Delaware, Lackawanna & Western and Atchison, Topeka & Santa Fe have taken no action on tools which builders have recently quoted on.

In the Chicago district the week's business was stepped up by the purchase of about \$50,000 worth of tools by T. L. Smith & Co., Milwaukee. A list is expected soon for the Fort Wayne, Ind., plant of the International Harvester Co.

A radial drill manufacturer in Cincinnati has advanced its prices and similar action is expected on competitive lines.

New York

NEW YORK, March 6.

ACTIVITY in machine tools is well maintained, with a fairly steady flow of new inquiries and a substantial volume of purchasing. Most of the present business is in equipment of medium size, but it is fairly well distributed. There is steady purchasing by large industrial users, such as the General Electric Co., which has made further purchases in the past week and still has a considerable list of tools to buy, and the Wright Aeronautical Corporation, which has bought several tools in the past week. Engine and turret lathes have been a feature of recent sales. The American Machine & Foundry Co., Brooklyn, has purchased four lathes, the Fairchild Airplane Mfg. Corporation, Farmingdale, L. I., bought one lathe and the Worthington Mower Co., Stroudsburg, Pa., a small lathe.

The railroads which buy in this district continue inactive. No action is as yet reported on the list of about 30 items issued by the Delaware, Lackawanna & Western and no purchases have been made by the New York Central, although it has a considerable list of inquiries for single tools that have been sent out since the first of the year. In the West, the St. Louis-San Francisco has purchased a Niles combination journal turning and axle lathe.

Included in recent machine tool purchases are a 40 x 48-in. lathe by a company in Worcester, Mass., 6 x 20-in. and 6 x 60-in. thread milling machine by a Rhode Island tool maker, Pratt & Whitney No. 3 die sinker by a forge company in Chicago, 14-in. vertical surface grinder by a Dayton, Ohio, tool company, 16 x 36-in. lathe by an Ohio manufacturer, a lathe of the same size by a Detroit motor manufacturer, 16 x 60-in. lathe, by an electric manufacturing company in the East, Pratt & Whitney 6 x 60-in. thread milling machine, by a Connecticut machine tool company, single spindle Sigourney drill, 7 x 32-in. bench lathe and a 13 x 30-in. engine lathe by a company in Newark, N. J.

Bids have been asked on general contract by Progressive Table Co., Inc., 272-78 Newport Street, Brooklyn, for a two-story factory, to cost \$60,000 with equipment. Kesster & Goldsmith, 4914 Church Avenue, are architects.

Packard Motor Car Co., Broadway and Sixty-first Street, New York, has filed plans for a three-story service, repair

and garage building, 210 x 225 ft., to cost \$500,000 with equipment. Frank S. Parker, 119 West Fifty-seventh Street, is architect and engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, is asking bids for 82 metal propeller blades for Long Island City base; also other similar blades for Great Lakes navy yard and Philadelphia navy yard, Schedule 8613.

Huschle Brothers, Inc., Anable Avenue and Creek Street, Long Island City, manufacturer of paper boxes and containers, has completed plans for a new three-story plant, 100 x 125 ft., to cost \$130,000 with machinery. Frank S. Parker, 119 West Fifty-seventh Street, New York, is architect and engineer. Anthony J. Huschle is head.

Bids will be asked at once by Otis Elevator Co., Eleventh Avenue and Twenty-sixth Street, New York, for a two-story addition to plant at Yonkers, N. Y., to cost more than \$100,000 with equipment. W. O. Moyer is engineer in charge of construction.

Clark Lighter Co., Inc., has been formed to take over and expand W. G. Clark & Co., Inc., 9 Maiden Lane, New York, manufacturer of pocket lighters and kindred products. New company has capital of 150,000 shares of stock, no par value, and will dispose of a block of stock for increased production.

Board of Education, Amenia, N. Y., is considering installation of manual training equipment in two-story and basement high school to cost \$175,000. Ernest Sibley, Bluff Road, Palisade, N. J., is architect.

Henry Fuldner & Sons, Inc., 404 East Fourteenth Street, New York, manufacturer of furniture, has acquired property at 217-25 East Forty-seventh Street, as site for a sixteen-story factory, 100 x 100 ft., to cost in excess of \$500,000. Present plant will be removed to new location.

Quartermaster Department, United States Army, Mitchell Field, N. Y., has plans for a new two-story repair field shop to cost about \$80,000, for which it is expected to ask bids during the summer.

Associated Gas & Electric Co., 61 Broadway, New York, is arranging for bond issue of \$50,000,000, a portion of fund to be used for extensions and improvements in light and power properties, and for acquisition of additional utilities.

Albany Perforated Wrapping Paper Co., Albany, N. Y., is arranging for increase in capital from 96,000 to 156,000 shares of stock, no par value, a portion of fund to be used for expansion. A special meeting has been called on April 2 for approval of new bond issue of \$3,000,000, part of proceeds to be used for similar purposes.

Ovens, power equipment, conveying and other machinery will be installed in the one-story baking plant to be erected

at Newburgh, N. Y., by W. E. Long Co., 155 North Clark Street, Chicago, to cost \$100,000.

Safe-T-Stat Co., Inc., 79 Bridge Street, Brooklyn, manufacturer of patented thermo-electric indicating equipment for combustion engines, etc., is arranging for sale of 55,000 shares of common stock, portion of proceeds to be used for expansion. Company recently acquired plant and business of W. G. Nagel Electric Co., Toledo, Ohio, and will develop facilities for manufacture of a complete electric-controlled dashboard panel of gages for automobiles.

Fords Porcelain Works, Inc., Lehigh Avenue, Perth Amboy, N. J., manufacturer of sanitary ware, plans rebuilding portion of plant destroyed by fire March 1, with loss reported at \$150,000 including equipment.

Asbury Park Ramp Garage, Inc., Asbury Park, N. J., has begun work on a four-story service, repair and garage building, 100 x 150 ft., to cost \$125,000 with equipment.

American Smelting & Refining Co., Perth Amboy, N. J., has filed plans for a one-story addition, 78 x 432 ft., with lean-to extension, 25 x 90 ft., for lead refining, to cost about \$75,000. Headquarters are at 120 Broadway, New York.

Vacuum Oil Co., 61 Broadway, New York, has awarded general contract to White Construction Co., 1015 Chestnut Street, Philadelphia, for a three-story addition to refinery at Paulsboro, N. J., for oil compounding and wax production, to cost \$75,000.

Board of Education, New Milford, N. J., plans installation of manual training equipment in new junior high school to cost \$400,000, for which plans will be drawn by Ernest Sibley, Bluff Road, Pallsade, N. J., architect.

British-American Metals Co., South Second Street, Plainfield, N. J., manufacturer of brass and copper tubing, etc., is adjusting insurance on portion of plant recently destroyed by fire, with loss of close to \$300,000, and contemplates rebuilding at an early date.

Curtis Mfg. Co., Newark, manufacturer of furnace blowers, etc., has leased a floor in the building at Central Avenue and Washington Street, for a new plant.

Public Service Electric & Gas Co., Public Service Terminal, Newark, has plans for erection of a two-story power substation, 30 x 62 ft., at Rahway, N. J., to cost close to \$50,000 with equipment.

Board of Education, Great Neck, L. I., plans installation of manual training equipment in new high school to cost more than \$400,000, for which bids will soon be asked on general contract. Gullbert & Betelle, 20 Branford Place, Newark, are architects.

Phoenix Welding & Machine Co., formerly at 389 Montgomery Street, Jersey City, has moved into larger quarters at 405 Montgomery Street. Additional machinery will be installed. W. A. Huff is president.

Wickes Machinery Co., 421 Clarmont Avenue, Jersey City, will sell its stock of machine tools and power equipment at public auction March 13. Sale will include machine tools, air compressors, motors, steam engines, hoisting engines, boilers, blowers and other equipment, nearly all of which has been rebuilt.

Buffalo

BUFFALO, March 5.

PLANS are being considered by Anco Photo Products, Inc., Charles Street, Binghamton, N. Y., manufacturer of cameras, tripods and other photographic equipment, for an addition to cost upward of \$50,000 with machinery.

Certain-Teed Products Corporation, 100 East Forty-second Street, New York, manufacturer of roofing materials, building products, etc., is arranging for early acquisition of Beaver Board Companies, Inc., and Beaver Products Co., Inc., Buffalo, manufacturer of wallboard, roofing and kindred products. Local plants will be continued and expansion carried out. A bond issue of \$13,500,000 is being sold by purchasing company, a considerable portion of proceeds to be used for project.

Thomas Carr, 1047 Monroe Parkway, Rochester, N. Y., and associates have organized Doraldina Co., capitalized at \$30,000, to establish a local plant for manufacture of automatic machines and other equipment.

Foote & Carpenter, 14 Franklin Street, Rochester, architects, have plans for a two-story and basement automobile service, repair and garage building, to cost close to \$90,000 with equipment.

Continental Can Co., Inc., Syracuse, N. Y., has purchased Passaic Metal Ware Co., Passaic, N. J., and will continue operations at same location as a subsidiary. Purchasing company also has recently acquired plant and property of United States Can Co., Norwood Station, Cincinnati, and Seattle-Astoria Iron Works, Inc., Seattle, both of which will be maintained in operation.

South Atlantic States

BALTIMORE, March 5.

PLANS are being considered by Bowker Chemical Co., Canton, Baltimore, for rebuilding portion of its fertilizer plant destroyed by fire Feb. 27, with loss in excess of \$200,000 including equipment. Company is a subsidiary of American Agricultural Chemical Co., 420 Lexington Avenue, New York.

Board of Awards, office of City Register, City Hall, Baltimore, will receive bids until March 14 for pumping machinery and accessories for Guilford waterworks station and Montebello filtration plant. E. G. Rost is water engineer.

Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, has secured permission to take over and consolidate Baltimore County Electric Co., Belair Electric Co., and other light and power properties with total capitalization of about \$20,000,000, and plans expansion and betterments, including transmission line construction.

Willys-Overland Co., Toledo, Ohio, manufacturer of automobiles, is reported considering erection of new assembling plant at Columbia, S. C., to cost more than \$500,000 with machinery.

Chief of Engineers, United States Army, Washington, will receive bids until March 13 for 15,000 ft. lead-covered cable and armored cable, with eight reels, circular 16.

C-P Motors, Inc., West Eighth Street, Charlotte, N. C., Edwin Burke, president, has plans for a new automobile manufacturing works, to cost in excess of \$200,000 with equipment. J. C. Boyd, First National Bank Building, is architect.

Carolina Power & Light Co., Raleigh, N. C., plans early construction of one-story power substation at Sanford, N. C., to cost close to \$100,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, is asking bids until March 13 for 24,080-lb. condenser tube sheets for Mare Island, Cal., Navy Yard, and for like amount for Puget Sound, Wash., yard, schedule 8589; for two electric winches and spares for Mare Island and two for Puget Sound, schedule 8595; until March 20 for hydraulic winches and parts for Mare Island and Puget Sound yards, schedule 8596; and for screwdrivers, etc., for Eastern and Western yards, schedule 8617.

Plainville Brick Co., Inc., Plainville, Ga., will make extensions and improvements in plant, with installation of crushing and other equipment. A light and power plant will be installed.

Lambeth Electric Supply Co., Winston-Salem, N. C., is planning establishment of a factory for manufacture of electrical specialties. Paul T. Lambeth is head.

Potomac Edison Co., Cumberland, Md., has secured permission to acquire Clear Spring Electric Light & Power Co., and controlling interest in Piedmont Electric Light & Power Co., and Potomac Light & Power Co., operating in western Maryland, and plans extensions and improvements, including transmission line construction.

Eagle Rock Lime Co., Eagle Rock, Va., plans installation of crushing and other machinery.

School Commissioners of Dorchester County, Cambridge, Md., contemplate installation of manual training equipment in three-story high school to cost \$175,000, for which plans are being drawn by Henry P. Hopkins and Allan C. Burton, 347 North Charles Street, Baltimore, architects.

Foard Mfg. Co., Lenoir, N. C., recently formed by Fred Foard and S. S. Jennings, both of Lenoir, plans operation of a local mill for manufacture of dowel pins and kindred specialties, with initial equipment for output of about 100,000 per day.

Commissioners of Public Works, Seneca, S. C., are asking bids until March 15 for a steel tank on steel tower, capacity 150,000 to 200,000 gal. H. S. Jaudon Engineering Co., Elberton, Ga., is engineer.

General Purchasing Officer, Panama Canal, Washington, will receive bids until March 20 for twist drills, files, tinners' snips, shovels, valves and other equipment, Panama schedule 1862.

Eastern Shore Public Service Co., Salisbury, Md., plans construction of a high-tension transmission line from Salisbury to Vienna, Md., where work is under way on initial unit of steam-operated electric generating plant, to cost more than \$500,000.

Wilder Lumber Co., 512 South Main Street, Tifton, Ga., is planning installation of a planer and other tools in wood-working plant. A new one-story mill, 50 x 120 ft., will be built.

American Radiator Co., West Thirty-eighth Street, Norfolk, Va., has leased a unit of property of Union Warehouses, Inc., for a new factory branch and distributing plant. Headquarters are at 40 West Fortieth Street, New York.

Georgia-Florida Motor Lines, Inc., Forsyth Theater Building, Atlanta, Ga., recently formed with capital of \$1,000,000 to take over and consolidate ten motor bus trans-

portation companies in Georgia and Florida, is planning the establishment of central repair and reconditioning shops, with parts department, etc., at Albany and Valdosta, Ga., to cost more than \$85,000.

F. M. Collins, Jr., 144 Olympic Place, Decatur, Ga., plans purchase of a motor-driven portable power saw, for use at local lumber plant.

New England

Boston, March 5.

MACHINE tool sales the past week fell off somewhat, and in most instances involved low priced tools. A new jig borer, taken by a Massachusetts manufacturer, was almost the only exception. The city of Boston has placed two cone-head lathes with the Hendey Mfg. Co., and a milling machine and grinder with the Brown & Sharpe Mfg. Co., also a fairly long list of sheet metal equipment, for its new continuation school. Quite a list of machine tools and wood-working equipment has yet to be placed by the city. The Pneumatic Drop Hammer Co. reports the sale of a 600-lb. and a 300-lb. hammer to an Ontario manufacturer. This company has just completed assembling a 500-lb. hammer in a Columbus, Ohio, shop, and a large Providence jewelry manufacturer has just installed a battery of four hammers. It expects to close soon on an order for a battery of 23 hammers. Other recent sales include a No. 1 Lapointe broaching machine to a Massachusetts shop, a 16-in. lathe to a Maine company, a 14-in. and a 16-in. lathe, two two-spindle drills, two Brown & Sharpe millers, a small power press, a three-spindle drill, a surface grinder, a fairly large planer and several bench tools, most of them to Massachusetts and Rhode Island users.

New inquiries are coming in slowly, and manufacturers who have had inquiries out for tools as far back as last October apparently are in no hurry to purchase. General business in New England is increasing, particularly in the textile and shoe industries, but recovery in metal-working lines is slow and there is a large number of skilled mechanics out of employment. Customers of metal working plants are buying on a hand-to-mouth basis. With practically no backlog orders on their books metal workers are putting off purchases of equipment until the business outlook is more assuring.

February small tool sales fell short of those for the previous month. January, however, was better than any month last year as some large buyers placed orders for first half requirements.

Industrial conditions in Springfield, Mass., are a little better than in most New England centers. Gilbert & Barker Mfg. Co. has added 400 to its force and is operating full time. Blair Mfg. Co. is employing a full force and operating overtime. Increases in operating schedules are reported also by Moore Drop Forging Co., Package Machinery Co. and Indian Motorcycle Co. Tiley Pratt Co., Essex, Conn., recently acquired by Torrington Co., is operating on a 24 hr. schedule with three shifts. Plant expansion this spring is under consideration.

Plant, real estate, machinery and equipment of Freeman-Daughaday Co., Charley, Mass., will be sold at public auction March 13.

Plans are in progress for a two-story machine shop for Emile St. Jacques, Main Street, Wareham, Mass.

Lockwood Greene & Co., 24 Federal Street, Boston, are preparing plans for a three-story, 80 x 100 ft., automobile service and repair shop for Charles Street Garage Corporation, Boston. L. K. Morse is president.

E. Sykes Goodwin, 29 Weybosset Street, Providence, has completed plans for a \$100,000 artificial ice plant at New Shoreham, R. I., to be built by Rhode Island Fish Co., 169 South Water Street, Providence.

Contract has been let by Royal Typewriter Co., New Park Avenue, Hartford, Conn., to Denis O'Brien & Sons, Inc., local, for a one-story addition, 35 x 120 ft., to cost about \$40,000.

Department of Public Buildings, City Hall, Boston, will soon take bids for a one-story power plant, to cost approximately \$100,000 with equipment. Desmond & Lord, 1 Beacon Street, are architects.

North Shore Delivery Co., 46 Lake Street, Lynn, Mass., is having plans drawn for a new one-story ice-manufacturing plant, to cost more than \$40,000. Funk & Wilcox Co., 26 Pemberton Square, is architect.

Municipal Light Board, Chicopee, Mass., has asked bids on general contract for a three-story automobile service,

repair and garage building, 60 x 75 ft., to cost close to \$90,000 with equipment. H. J. Tessier, 1132 Main Street, Springfield, Mass., is architect.

Charles H. Tenney & Co., 200 Devonshire Street, Boston, operating public utility properties, including Salem Electric Lighting Co., Salem, Mass., have plans under way for a super-power electric generating plant at Salem, where waterfront site has been secured, to cost more than \$750,000 with transmission lines.

P. J. Kiley, 101 Washington Street, Somerville, Mass., will erect a one-story plant, 95 x 100 ft., for manufacture of automobile bodies.

Beardsley & Wolcott Mfg. Co., Waterbury, Conn., has been formed to take over and consolidate Beardsley Mfg. Co., with local plant, and Wolcott Mfg. Co., Hartford, Conn., both manufacturers of electrical products. Operations will be continued at both factories at present, with anticipated consolidation at Waterbury. C. E. Beardsley is president and treasurer; Frank E. Wolcott, vice-president; and Rowley W. Phillips, secretary.

Jackson-Butler Corporation, St. Johnsbury, Vt., contemplates rebuilding its two wood-working plants partially destroyed by fire Feb. 27, with loss estimated at \$75,000 including equipment.

Milwaukee

MILWAUKEE, March 5.

WHILE the volume of machine-tool sales is slow in making gains, the number and character of inquiries indicate a substantial improvement in business. In most quarters the expectancy relative to March trade is encouraging. Although the dearth of industrial construction in this locality is still evident, several of the largest industries are entering the market for additional equipment for replacement or to provide greater capacity. Foundry and machine shop employment continues to gain as automotive shops furnish delivery specifications in greater volume on castings, forgings, and other equipment.

Twin Disc Clutch Co., 1328 Racine Street, Racine, Wis., manufacturer of industrial and automotive clutches and transmission specialties, is erecting a one and two-story addition, 60 x 180 ft., and is inquiring for miscellaneous equipment, including automatic machinery. Investment will be approximately \$65,000.

E. I. Du Pont de Nemours Co., Wilmington, Del., has plans for the remodeling of branch works at Barksdale, near Washburn, Wis., and erection of four additional units, with installation of a new acid process, at a cost of \$425,000. R. T. Cann is general superintendent at Barksdale.

Appleton Steel Tube Co., 224 West Spencer Street, Appleton, Wis., a new organization which recently took over operation of an existing plant, is erecting a shop extension, 30 x 60 ft. and will require some additional equipment.

Fire, Feb. 25, destroyed one-story frame machine shop, 120 x 200 ft., of Racine Screw Works, Racine, Wis., and damaged a quantity of automatic screw machines and other equipment. Loss is estimated at fully \$200,000.

United Coal & Dock Co., 8 Wells Street, Milwaukee, has plans for construction and equipment of a plant costing \$250,000 for manufacturing coal briquettes. It will be the first industry of its kind in Milwaukee. Similar plants are operating at Duluth and Superior. Milwaukee plant will be ready to start operations about Oct. 1. Capt. A. P. King is president and general manager.

Wisconsin Motor Bus Lines, division of Milwaukee Electric Railway & Light Co., 215 Michigan Street, Milwaukee, has purchased a site at Madison, Wis., for a motorbus terminal, garage and service station, to be erected at once at a cost of \$50,000. Fred H. Luber is company architect.

Minogue Engineering Co., Manitowoc, Wis., has been organized by Roland E. Minogue, engineer, 1302 Wisconsin Avenue, local, and will establish a plant for manufacture of machinery, motors, engines, etc. Definite details have not been made public.

Milwaukee Department of Public Works will soon be ready for bids for the erection of a two-story building, 100 x 140 ft., for use as a fire department construction and repair shop. Complete production equipment and a 5-ton electric, hand controlled crane are specified. C. E. Mallig is city architect, and R. E. Stoelting, commissioner of public works. The cost is estimated at \$100,000.

Parker Harvester Corporation, Cedarburg, Wis., has been incorporated with \$100,000 capital stock to take over plant of former Lowenbach Shoe Co., for production of a newly developed beet harvesting machine designed by Stanley F. Parker, 963 Mitchell Street, Milwaukee. Other principals

are E. B. Lowenbach, 420 Newberry Boulevard, and Anton Harlfinger, 773 Twenty-second Avenue, Milwaukee. Alterations to plant are under way.

Detroit

DETROIT, March 5.

WORK will soon begin on an addition to plant of Sparks-Withington Co., Jackson, Mich., manufacturer of radio and automotive equipment, to cost upward of \$75,000 with equipment. A boiler plant will also be erected. Lockwood, Greene & Co., 400 North Michigan Avenue, Chicago, are architects and engineers.

Consumers Power Co., Jackson, Mich., is considering a two-story equipment storage and distributing plant, with repair department, at Grand Rapids, Mich., to cost about \$50,000.

City Council, Royal Oak, Mich., has plans under way for a municipal pumping plant to cost about \$75,000, of which close to \$50,000 will be expended for equipment.

Universal Cooler Co., 1214 Eighteenth Street, Detroit, manufacturer of electrical supplies and equipment, is arranging for sale of a bond issue for \$250,000, a portion of proceeds to be used for expansion and improvements.

Karp Brothers Coal & Ice Co., 3900 Orleans Street, Detroit, has plans for a new one-story ice-manufacturing plant, 50 x 175 ft., to cost about \$100,000 with equipment.

Aero-Craft Mfg. Co., Detroit, care of Peerless Pattern Works, 1489 East Fort Street, recently organized, is planning early erection of a new plant for manufacture of commercial airplanes, with main model of bi-plane type, equipped with 120-hp. motor. Initial planes will be manufactured at plant of Peerless company. Clement W. Brown is president, and Frederick West, vice-president.

United States Radiator Corporation, 133 East Grand River Boulevard, Detroit, is disposing of a bond issue of \$3,500,000, a portion of proceeds to be used for expansion and improvements, including recent acquisition of Pacific Steel Boiler Co., Waukegan, Ill., to be operated as a subsidiary.

Chris Smith & Sons Boat Co., Algonac, Mich., manufacturer of motor boats, has an expansion and improvement program in progress, following partial destruction of plant a few months ago by fire. Increased floor space will be arranged, with installation of equipment and facilities to triple former output.

Detroit Edison Co., Second Avenue, Detroit, has plans for a new power substation at Royal Oak, Mich., to cost \$135,000 with equipment. Extensions will be made in transmission lines.

Philadelphia

PHILADELPHIA, March 5.

CONTRACT has been let by Department of City Transit, 1211 Chestnut Street, Philadelphia, to Pennsylvania Engineering & Construction Co., Real Estate Trust Building, for a one-story equipment storage and distributing building, with repair department, to cost about \$65,000.

Olney Foundry Co., 180 West Duncannon Street, Philadelphia, manufacturer of gray iron castings, etc., has filed plans for a one-story addition, to cost about \$40,000 with equipment.

Philip S. Tyre, 114 South Fifteenth Street, Philadelphia, architect, has plans for a one and two-story automobile service, repair and garage building at Chester, Pa., to cost approximately \$90,000 with equipment.

National Steel Equipment Co., 3342 Rorer Street, Philadelphia, manufacturer of filing cabinets, etc., has filed plans for two one-story additions, one to be equipped as a machine shop and other for general manufacturing, to cost about \$24,000 with equipment.

Clarence E. Wunder, 1520 Locust Street, Philadelphia, architect, has filed plans for a one-story automobile service, repair and garage building, to cost about \$100,000 with equipment.

Board of Trustees, Haverford College, Haverford, Pa., will soon take bids for a two-story and basement engineering laboratory, 70 x 80 ft., to cost approximately \$110,000, with testing and other machinery. Mellor, Meigs & Howe, 205 South Juniper Street, Philadelphia, are architects.

Officials of Eureka Flint & Spar Co., New York Avenue, Trenton, N. J., operating a feldspar grinding mill and raw material properties, have formed new company of same name, with capital of \$1,350,000, to take over and expand present organization. Thomas H. and Frank W. Thropp head new company.

John W. Knerr, Cedar Grove, near Belvidere, N. J., operating ice-manufacturing plants, has plans for a new plant on the Pequest River, Belvidere, to cost \$60,000 with machinery.

School District of Upper Merion Township, Swedeland, Pa., is considering installation of manual training equipment in two-story junior high school to cost \$200,000. Ritter & Shay, Fifteenth and Chestnut Streets, Philadelphia, are architects.

Roxborough Motors, Inc., Lyceum Street and Ridge Avenue, Philadelphia, local representative for Chrysler automobiles, has leased a new multi-story building, 45 x 200 ft., to be erected at 6221 Ridge Avenue, for a service, repair and sales building, to cost in excess of \$125,000 including equipment.

National Power & Light Co., Allentown, Pa., operating Pennsylvania Power & Light Co., East Penn Electric Co., Harrisburg Light & Power Co., and other electric light and power properties, has arranged for preferred stock issue to total \$10,314,000, a portion of fund to be used for expansion and improvements. Pennsylvania Power & Light Co. is arranging for construction of 66,000-volt transmission line from substation at Berwick, Pa., to power plant of Luzerne County Gas & Electric Co., in Hunlock Creek section. National company is under direction of Electric Bond & Share Co., 71 Broadway, New York.

Plant and machinery of Gehret Brothers, Inc., East Fourth Street, Bridgeport, Pa., manufacturer of structural steel and ornamental iron products, will be offered for sale by W. R. Browne, receiver, March 17.

Bellanca Aircraft Corporation, Arlington, S. I., will begin immediate construction of plant at New Castle, near Wilmington, Del., where 350 acres recently was acquired, to cost \$100,000 with equipment. Giuseppe Bellanca is head.

Scranton Gas & Water Co., Scranton, Pa., has arranged for bond issue of \$11,000,000, a portion of proceeds to be used for extensions and improvements in plant and system.

Danville Structural Steel Co., Danville, Pa., has plans for a new unit to cost in excess of \$75,000. Company was acquired recently by Charles M. Schwab, head of Bethlehem Steel Corporation, Bethlehem, Pa.

Chicago

CHICAGO, March 5.

FEBRUARY closed with total sales above those in January and in excess of the same month last year. Purchases in the last seven days showed marked improvement, but orders and new inquiry are spotty. A number of old propositions have been revived. T. L. Smith & Co., Milwaukee, have purchased \$50,000 worth of machine tools, and it is probable that the International Harvester Co. will soon issue a list for its Fort Wayne, Ind., plant.

Fresh railroad inquiry includes a 2 x 14-in. Norton grinder by the Santa Fe; a Canedy-Otto drill, a 36-in. drill press and a No. 660 C.A.W. semi-portable grinder by the Rock Island, and a heavy-duty portable grinder, a two-wheel vertical spindle grinder, a 1 x 10-in. grinder and a 2 x 12-in. grinder by the Burlington. A fair amount of inquiry is noted for used machinery, but dealers are experiencing some trouble in finding good equipment of this kind.

Hayes-Custer Stove & Furnace Co., Bloomington, Ill., has recently acquired additional property on which it will erect a plant extension.

G. Phillips, Southerland Hotel, Chicago, will build a three-story brick garage, 100 x 175 ft.

Commonwealth Edison Co., 72 West Adams Street, Chicago, will build a substation, 42 x 103 ft. H. V. Von Holst, 140 Monroe Street is architect.

Wenig & Tennis, 1406 Greenlea Avenue, Chicago, will build a four-story garage, 100 x 100 ft., to cost \$150,000.

Troy Laundry Machinery Co., East Moline, Ill., has arranged for bond issue of \$3,000,000, a portion of proceeds to be used for expansion and improvements. Company is operated by Manhattan Electrical Supply Co., Inc., 11 Park Place, New York.

Board of Trustees, Illinois College, Jacksonville, Ill., is considering a new steam power plant at the institution, primarily for heating service, to cost about \$50,000 with equipment.

Chamberlain Machine Works, 2500 East Fourth Street, Waterloo, Iowa, Floyd L. Chamberlain, head, has filed plans for a one-story addition, 36 x 100 ft., a portion of structure to be used for assembling.

Northern States Power Co., Minneapolis, Minn., is arranging an expansion and improvement program to cost approximately \$8,000,000, of which about \$2,000,000 will be used for completion of projects now under way. New work includes a hydroelectric generating plant at Chippewa Falls,

The Crane Market

THERE is very little new inquiry for either overhead or locomotive cranes, but there is a fair volume of business to be placed that has accumulated since the first of the year. Apparently, with many prospective purchasers, business has not been quite as large as had been expected earlier in the year, so that they are inclined to delay placing orders for additional equipment pending further improvement. About the largest current inquiry for overhead cranes is the list of two 225-ton locomotive handling cranes and one 50-ton standard overhead crane for the Reading Co. In the locomotive crane field, the Amtorg Trading Corporation, 165 Broadway, New York, is reported about to close on six 15-ton, kerosene driven crawl-tread locomotive cranes

and one 25-ton standard gage locomotive crane for Russia. This company is understood to be preparing a future inquiry for nine 40-ton locomotive cranes for export to Russia.

Among recent purchases are:

New York, New Haven & Hartford Railroad, New Haven, Conn., 10-ton, 70-ft. span electric traveling crane with 2-ton auxiliary from Niles Crane Corporation.

City of Hagerstown, Md., 10-ton, 42-ft. 6-in. span electric traveling crane from Niles Crane Corporation.

Sanderson & Porter, consulting engineers, New York, 10-ton, 22-ft. 10-in. span hand power crane for use in West Virginia from Box Crane & Holst Corporation.

Wis., extensions in power plants at Minot and Grand Forks, N. D.; transmission lines, power substations and miscellaneous construction. Company is under direction of H. M. Bylesby & Co., 231 South La Salle Street, Chicago.

Board of Education, Great Falls, Mont., plans manual training department in three-story high school to cost \$800,000, for which it is expected to ask bids on general contract in May. Bird & Van Teylingen, Great Falls, are architects, and Croft & Boerner, 1004 Marquette Avenue, Minneapolis, Minn., associate architects.

Chicago, Burlington & Quincy Railroad, 547 Jackson Boulevard, Chicago, will soon take bids for a one-story local power plant, to cost more than \$40,000 with equipment. W. T. Krausch is chief engineer.

Reliance Enameling & Stamping Co., Belleville, Ill., is reported planning an addition, to cost in excess of \$50,000 with equipment.

Kremer Motor Co., 1518 Hennepin Avenue, Minneapolis, Minn., expects to ask bids in about 30 days for a one-story and basement service, repair and garage building, 150 x 155 ft., to cost about \$100,000 with equipment. Perry E. Crosier, New York Life Building, is architect.

J. I. Case Threshing Machine Co., Racine, Wis., has plans for a three-story and basement addition to its factory branch and distributing plant at Des Moines, Iowa, to cost about \$34,000. C. V. Johnson, Commonwealth Building, Des Moines, is architect.

Hannifin Mfg. Co., 621 South Kolmar Avenue, Chicago, manufacturer of air chucks, machine tool equipment, etc., has acquired adjacent property, 75 x 125 ft., and contemplates early erection of two-story plant to cost about \$55,000. It is understood that present works will be removed to new location.

Barnes Zinc Products Co., 1531 Kingsbury Street, Chicago, fabricator of conductor pipe, eaves troughs and fittings, has changed its name to Barnes Metal Products Co.

St. Louis

ST. LOUIS, March 5.

PLANS are being drawn by Atchison, Topeka & Santa Fe Railroad Co., Topeka, Kan., for a one-story machine shop at repair works at Guthrie, Okla., 80 x 135 ft., to cost about \$45,000.

Silica Mines Co., Meade, Kan., is planning to rebuild plant, with installation of new equipment, to cost \$65,000. M. T. Garlow is head.

Oklahoma Power & Water Co., Tulsa and Sand Springs, Okla., is disposing of bond issue of \$4,500,000, portion of fund to be used for expansion and improvements in electric light and power properties, including purchase of additional utilities. William H. Colvin is chairman of the board.

Arkansas Cold Storage Co., foot of Rock Street, Little Rock, Ark., will soon break ground for a three-story addition to ice-manufacturing and cold storage plant, to cost approximately \$90,000 with equipment. Clarence E. Rose is general manager.

South Side Chevrolet Co., 3645 South Grand Boulevard, St. Louis, representative for Chevrolet automobile, has plans for a three-story automobile service, repair and garage building, to cost more than \$100,000 with equipment. D. R. Harrison, Ambassador Building, is architect.

Corn Products Refining Co., Tenth and Cherry Streets, North Kansas City, Mo., has superstructure under way for a five-story and basement addition, 90 x 140 ft., to cost close to \$200,000 with equipment. Engineering department, 208 East Illinois Street, Chicago, is in charge.

Camden Ice & Coal Co., Camden, Ark., has taken out a permit for an ice-manufacturing and cold storage plant, to cost \$80,000 with equipment.

Ovens, power equipment, conveying and other machinery will be installed in the new plant of Rex Baking Co., Tulsa, Okla., on which work has begun, to cost more than \$200,000. Patterson Corporation, 4050 Pennsylvania Avenue, Kansas City, Mo., is in charge.

Oliver Anthony, Bearden, Ark., and associates are planning establishment of a furniture factory to cost about \$55,000 with equipment. A company will be organized to carry out project. J. L. Williams, Bearden, is interested.

E. A. Liebman, 3509 Classen Street, Oklahoma City, Okla., is at head of a project to construct and operate an ice-manufacturing plant at Shawnee, Okla., to cost \$75,000.

Studebaker-Riley Co., 2610 Grand Avenue, Kansas City, Mo., representative for Studebaker automobile, has leased a new two-story and basement building, 105 x 185 ft., to be erected on Ward Parkway, for a service, repair and sales building, to cost in excess of \$100,000 with equipment. E. W. Tanner, Meyer Boulevard, is architect.

Board of Education, Lincoln, Neb., plans installation of manual training equipment in new two-story Everett Junior High School, for which bids are being received on general contract until March 13, to cost \$300,000. Davis & Wilson, 525 South Thirteenth Street, are architects.

Cincinnati

CINCINNATI, March 5.

MACHINE tool sales again have turned upward and give promise of reaching a fairly high point during March. Fresh inquiries are in less volume, but the amount of pending business is large. One interesting development is that some builders reporting increased bookings did not participate in the flurry of buying in January and February. Orders are well diversified both as to the class of buyers and territories. Production in local plants is being maintained at a moderate rate.

The St. Louis-San Francisco Railroad closed the past week against its list. Some of the tools, including a shaper and a combination journal turning and axle lathe, were placed with companies in this district, but purchases also were made from Eastern builders. The Chicago, Burlington & Quincy has issued a list of equipment which Cincinnati manufacturers now are bidding on. It is understood that the Santa Fe has not yet taken action on its requirements.

A leading radial drill builder has revised its prices upward the past week. Advancing costs are likely to result in similar action on the part of other drill manufacturers in the near future.

Contract has been let by Cincinnati Ball Crank Co., Disney Street, Cincinnati, to Austin Co., Cleveland, for a one-story addition to cost about \$15,000.

Harry Hake, 2400 Gilbert Avenue, Cincinnati, architect, has plans for a four-story automobile service, repair and garage building, to cost about \$500,000 with equipment.

Ovens, power equipment, conveying and other machinery will be installed in the one-story baking plant to be erected by Earl Dickason, Chillicothe, Ohio, to cost about \$125,000. W. E. Long Co., 155 North Clark Street, Chicago, is architect.

Air Corps, Material Division, Wright Field, Dayton, Ohio, is asking bids until March 15 for airplane parts, including cowlings assemblies, shutter and bracket assemblies, etc., circular 258; until March 12 for 1145 streamline tie rods, circular 255; and until March 15 for tubing, safety nipples, etc., circular 257.

City Council, Bowling Green, Ky., will receive bids until March 27 for a water-softening and filtration plant, including motor-driven pumps, traveling water screen, pipe lines, etc., and elevated water tank. J. N. Chester Engineers, Union Bank Building, Pittsburgh, are engineers.

Dayton Friction Toy Co., Hawthorn and Krug Streets, Dayton, Ohio, will proceed with erection of one-story addition to cost \$21,000, for which general contract has been let to F. K. Vaughn Building Co., Dayton.

Mississippi River Commission, Memphis, Tenn., First and Second Districts, will receive bids until March 20 for two all-steel bins with batch-measuring devices, and for two concrete mixers with boom and bucket; also for machinery for concrete slab casting plant; until March 15 for one boiler and equipment.

Fire recently destroyed a portion of building at Louisville, occupied by Childers Electric Co., Brandels Machinery & Supply Co., and Tafel Electric Co., with total loss estimated at \$80,000.

Board of Education, Louisville, is considering installation of manual training equipment in new three-story junior high school to cost about \$350,000, for which plans will be drawn by J. M. Colley, architect for board.

Service Motor Car Co., Memphis, Tenn., has plans for a one-story machine and repair works, 195 x 210 ft., to cost about \$85,000 with equipment. Hanker & Cairns, Hill Building, are architects.

American Radiator Co., 40 West Fortieth Street, New York, has leased property at Brook Street and Eastern Parkway, Louisville, and contemplates establishment of new factory branch and distributing plant.

Board of County Commissioners, Springfield, Ohio, is considering purchase of new stone crushing plant and has instructed W. H. Sleeverling, County engineer, to secure costs.

Pittsburgh

PITTSBURGH, March 5.

ALTHOUGH individually small, machine tool orders are sufficiently numerous for dealers to report business as fairly good. Purchases usually represent actual needs and there is not as much delay between the inquiry and sale as is often the case. In the heavier lines of equipment, a good inquiry is noted for cranes, but orders are few. The Jones & Laughlin Steel Corporation has ordered a second seamless pipe-making unit for its Alleghenya works and the Carnegie Steel Co. is reported as planning an extension of its McDonald, Ohio, bar mills.

Plans are being arranged by Allegheny Steam Heating Co., 435 Sixth Avenue, Pittsburgh, subsidiary of Duquesne Light Co., for a central steam power plant for heating service, with boilers, stokers, skip hoists and other coal and ash-handling machinery, to cost close to \$1,800,000, including tunnels and underground pipe lines.

Pittsburgh Safety Glass Co., operated by Pittsburgh Plate Glass Co., Frick Building, Pittsburgh, has plans for first unit of plant at Creighton, Pa., adjoining works of parent company, for production of laminated shatterproof sheet glass, to cost more than \$600,000 with equipment. Company was formed recently with capital of \$1,000,000. H. S. Wherrett is president.

United States Engineer, Keenan Building, Pittsburgh, is asking bids until March 28 for a hydroelectric power plant at Lock 6, Allegheny River, near Clinton, Pa.

Beaver Valley Water Co., Beaver Falls, Pa., will soon take bids for a one and two-story equipment storage and repair shop, to cost more than \$75,000 with equipment. J. E. Martsoff, 512 Third Avenue, New Brighton, Pa., is consulting architect.

City Council, Parkersburg, W. Va., is asking bids until March 13 for a high-lift pumping station, iron removal plant and other equipment for municipal waterworks. Morris Knowles, Inc., Westinghouse Building, Pittsburgh, is engineer.

Northside Garage, Pittsburgh, has leased two-story building, 50 x 180 ft., at 104-8 West North Avenue, and will remodel for a service, repair and garage building, total project to cost in excess of \$120,000 including rental.

George & Sherrard Paper Co., Wellsburg, W. Va., operated by International Paper Co., 100 East Forty-second Street, New York, has approved plans for extensions and improvements in mill to double present capacity, including facilities for production of heavy bags for cement, lime, etc., to cost more than \$50,000 with equipment.

Pennzoll Oil Co., Oil City, Pa., has plans for an addition to its generator plant at Rouseville, Pa., 50 x 80 ft., to cost approximately \$45,000 with equipment.

Pittsburgh Water Heater Co., Jenkins Building, Pittsburgh, with plant at Crafton, Pa., is disposing of a bond issue of \$1,200,000, a portion of proceeds to be used for expansion and improvements. Company also operates Pittsburgh Melting Co.

Board of Education, Ambridge, Pa., contemplates installation of manual training equipment in new junior high school to cost \$180,000, for which plans will be drawn by W. Ward Williams, 309 Fourth Avenue, Pittsburgh, architect.

Cleveland

CLEVELAND, March 5.

ABRIGHTER outlook in the machine tool industry than for some time is indicated by a better volume of inquiry, according to reports of most manufacturers and dealers. Sales were fair the past week, although orders were limited to single machines. February sales with some dealers and manufacturers showed a slight gain over January, but with others business was slightly below the previous month. No inquiries of any size came out during the week. Following the recent spurt of activity in the automotive field, the Detroit market is rather quiet.

National Sanitary Co., Salem, Ohio, will rebuild its plant recently destroyed by fire. Contracts will be placed soon for new buildings, including foundry and cleaning room, enameling department and warehouse. Considerable equipment will be required.

Vermont Marble Co., 9508 Quincy Avenue, Cleveland, has awarded general contract to H. K. Ferguson Co., for a one-story plant, 80 x 280 ft., for cutting, grinding, polishing, etc., with two-story office, to cost \$120,000 with equipment. A. T. Howe is branch manager. Headquarters are at Proctor, Vt.

Lake Erie Power & Light Co., Sandusky, Ohio, has applied for permission to purchase Suburban Power Co., operating in Erie, Wood and Sandusky counties, and plans expansion in power facilities and transmission lines.

Sun Oil Co., East Toledo, Ohio, will rebuild portion of local refinery and distributing plant destroyed by fire Feb. 26, with loss in excess of \$150,000 including equipment.

Hinde & Dauch Paper Co., Sandusky, Ohio, manufacturer of corrugated paper boxes and containers, etc., is arranging for sale of preferred stock to total about \$4,500,000, a portion of fund to be used for expansion and improvement. Company recently acquired Thompson & Norris Co., Brooklyn, N. Y., and J. M. Raffel Co., Baltimore, manufacturers of kindred products, and is now operating thirty plants in sixteen different cities.

Federal Radiator & Boiler Co., Zanesville, Ohio, will rebuild portion of plant destroyed by fire Feb. 28, with loss close to \$90,000 including equipment.

Gulf States

BIRMINGHAM, March 5.

PLANs are being considered by Louisiana Oil Refining Corporation, Minden Road, Shreveport, La., for rebuilding portion of refinery recently destroyed by fire, with loss estimated at \$100,000 including equipment.

Uriah Ice & Gin Co., Pensacola, Fla., is planning construction of a new ice-manufacturing and cold storage plant, to cost approximately \$90,000 with machinery.

Board of Education, Corpus Christi, Tex., plans installation of manual training equipment in new high school, for which bonds for \$300,000 have been voted. Hardy & Curran, Nixon Building, are architects.

John E. Mitchell Co., 600 South Sixth Street, St. Louis, manufacturer of cotton ginning machinery, flour mill equipment, etc., has received a low bid from Lee Morris Co., 5617 East Grand Street, Dallas, Tex., for a two-story branch plant, 100 x 216 ft., at last noted place, to cost approximately \$100,000 with equipment. J. A. Pitzinger, Southwestern Life Building, Dallas, is architect and engineer.

Texas-Louisiana Power Co., Pecos, Tex., will proceed with extensions and improvements in local power plant, including installation of three 1250-hp. generating units and auxiliary equipment; provision will be made for addition of two more units of like capacity. Extensions will be made in transmission lines. Entire project will cost more than \$200,000. Allen J. Smith is general manager.

Sibert-Hayes Motors, Inc., 1920 South Fourth Avenue, Birmingham, has arranged for erection of two-story service, repair and garage building, 100 x 100 ft., to be occupied under lease, to cost close to \$90,000 with equipment. Turner & McPherson, Martin Building, are architects.

United States Engineer, Galveston, Tex., will receive bids until March 12 for two 20-in. dredging pumps and other pumping units, with impeller shafts, liners, etc., circular 182.

Texas Ice & Fuel Co., Houston, Tex., will soon begin work on a one-story ice-manufacturing plant, to cost \$85,000 with machinery.

Interstate Cotton Oil Refining Co., Sherman, Tex., has plans for a one-story addition for manufacture of containers, to cost \$40,000 with machinery.

Southern Packing Corporation, Eleventh Avenue, St. Petersburg, Fla., recently formed by William Stephany, 119 West Fifty-seventh Street, New York, and associates, with capital of \$300,000, is completing plans for a local plant for production of chemical specialties, to cost more than \$100,000 with machinery.

C. F. Elledge, 554 Forest Street, Jacksonville, Fla., is in the market for a machine for compressing and baling sheet metal scrap.

Shreveport Producing & Refining Corporation, Commercial Bank Building, Shreveport, La., has begun an expansion and improvement program at its oil refinery at Jewella, La., with additional equipment for handling 10,000 bbl. of crude oil per day, to cost in excess of \$200,000.

Hillsborough County Board of Public Instruction, Tampa, Fla., has approved plans for a one-story manual arts building at Ballast Point school, to cost close to \$26,000 with equipment. Gallher & Crowe, Ashley Street, are architects.

Bayou State Refining Corporation, Slattery Building, Shreveport, La., has awarded general contract to Graver Corporation, 844 Rush Street, Chicago, for a new oil refinery at Rosston, La., to cost about \$225,000 with machinery.

Glidden Co., 2876 Attleboro Road, Cleveland, manufacturer of paints, varnishes, etc., is reported considering erection of new plant at Houston, Tex., to cost close to \$130,000 with equipment.

Wichita Falls Airport Co., Wichita Falls, Tex., plans construction of a hangar, machine and repair shop, and other buildings on a 240-acre tract on Burkburnett Road to be developed for an aviation field, to cost more than \$45,000 with equipment.

Houston Lighting & Power Co., Houston, Tex., is said to be arranging an expansion and improvement program and is authorizing fund of about \$6,000,000 for increased power and transmission facilities. Plans are being completed for a power substation to cost about \$200,000 with equipment.

Southern Ice & Utilities Co., Santa Fe Building, Dallas, Tex., will proceed with erection of one-story ice-manufacturing plant at Odessa, Tex., to cost about \$45,000 with equipment.

Union Carbide & Carbon Co., 30 East Forty-second Street, New York, is said to have plans for two one-story plant units at Shreveport, La., to cost \$150,000 with equipment.

Indiana

INDIANAPOLIS, March 5.

PLANS are under way by E. F. Miller, Farmers' Trust Building, Anderson, Ind., architect, for a two-story and basement automobile service, repair and garage building, 85 x 125 ft., at Logansport, Ind., to cost \$95,000 with equipment.

National Radiator Co., Utica, N. Y., formed by recent merger of Utica Radiator Co., Niagara Radiator & Boiler Co., Continental Boiler & Radiator Co., and other interests, has leased space on West Georgia Street, Indianapolis, for a new factory branch and distributing plant. A similar factory branch will be established at Louisville. H. Weers, 57 South Bolton Avenue, Indianapolis, is local manager.

Delco-Remy Corporation, Anderson, Ind., manufacturer of automobile starting and lighting equipment, will soon break ground for a one-story and basement foundry to cost about \$75,000. Company is a division of General Motors Corporation.

Durant Motor Co., 250 West Fifty-seventh Street, New York, has disposed of its plant at Muncie, Ind., formerly works of Interstate Motor Co., to Merchants' Trust & Savings Co., Muncie, and will discontinue operations permanently at that point.

Dixon Burial Casket Co., Dixon, Ill., is said to be planning establishment of a branch plant at Richmond, Ind. It is understood that company has acquired local property of Richmond Casket Co., recently offered at a receiver's sale, and will remodel.

Board of Education, Elkhart, Ind., has begun superstructure for a three-story and basement high and vocational school addition at Second and High Streets, to cost \$160,000. Hubert Miller, Monger Building, is associate architect.

Fame Canning Co., Shelbyville, Ind., contemplates rebuilding portion of plant recently destroyed by fire, with loss in excess of \$350,000 including machinery. Headquarters are at 38 East Washington Street, Chicago.

Pacific Coast

SAN FRANCISCO, Feb. 29.

CONTRACT has been let by Bunting Iron Works, 820 Parker Street, Berkeley, Cal., to Lawton & Vezey, 354 Hobart Street, Oakland, Cal., for a new one and two-story plant to cost close to \$28,000. Benjamin G. McDougall, 353 Sacramento Street, San Francisco, is architect.

Monolith Portland Cement Co., Bartlett Building, Los Angeles, is arranging an expansion and improvement program at its mill at Tehachapi, Cal., to cost about \$250,000, including installation of additional equipment.

American Fiber Products Co., 526 Bay Street, San Francisco, contemplates a new plant in vicinity of Chico, Cal., for manufacture of strawboard, rice paper specialties, etc., to cost more than \$75,000 with equipment.

East Bay Iron & Metal Works, 2310 Peralta Street, Oakland, Cal., is considering rebuilding portion of plant recently destroyed by fire, with loss estimated at \$65,000 including equipment.

Santiago Orange Growers' Association, Orange, Cal., plans installation of an ice and pre-cooling plant in connection with a new one-story packing house. Conveying and other mechanical equipment will be installed in packing division. Entire project will cost about \$125,000.

Pacific Gas & Electric Co., 245 Market Street, San Francisco, is planning extensions and improvements in power plant and transmission lines at Lodi, Cal., and vicinity to cost about \$75,000. A new power substation will be built in vicinity of Yuba City, Cal., and additions made in transmission lines to cost a like amount.

Doernbecker Mfg. Co., East Twenty-eighth Street, Portland, manufacturer of furniture, has plans under way for an addition, to cost about \$450,000 including machinery.

Belmont Copper Co., Superior, Ariz., has approved plans for a new flotation plant with capacity of about 200 tons, to cost in excess of \$450,000 with equipment.

San Juan Pulp Mfg. Co., Laurel Street and Cornwall Avenue, Bellingham, Wash., is contemplating an addition with capacity of about 40 tons of pulp per day, doubling present output, to cost more than \$100,000. Ossin Anderson is president.

Cousins Tractor Co., Hanford, Cal., has acquired adjoining property, 50 x 150 ft., and plans erection of an addition, to be used primarily for machine shop and tractor assembly, to cost about \$60,000. Edward Cecil is head.

Arizona Light & Power Co., Phoenix, Ariz., is arranging an expansion and improvement program to cost approximately \$1,100,000, including additional power facilities, new transmission lines, power substations and miscellaneous work.

Board of Public Utilities, Riverside, Cal., is considering a new municipal steam-operated electric power plant, with capacity of 5000 kw., and has authorized R. L. Boulden, superintendent, to secure details of equipment and estimates of cost.

National Ice & Cold Storage Co., Postal Telegraph Building, San Francisco, plans construction of ice-manufacturing and cold storage plant at Hollister, Cal., where site, 70 x 240 ft., has just been purchased, to cost about \$70,000.

Beall Pipe & Tank Corporation, Portland, Ore., has opened a branch office at 2342 Sixty-second Street, Seattle, under management of J. V. Hyde. It is stated company is considering building a branch plant there.

Barde Steel Co., Seattle, has been granted a charter with a capital of \$300,000, and has succeeded to business formerly carried on under name of M. Barde & Sons Steel & Machinery Co.

A machine shop, 40 x 80 ft., will be built by Farrell Iron Works at 1215 Valley Street, Seattle.

Canada

TORONTO, March 5.

LOCAL dealers and builders report a good volume of machine tool business. While much of this consists of orders for single tools for garages and repair plants, some lists are in prospect for additions and replacements by automobile manufacturers. A strong demand for equipment features both Toronto and Montreal markets as a result of the heavy buying by mining interests in northern Ontario, Manitoba and Quebec. Municipal governing bodies are preparing to enter the market for equipment for local waterworks, sewage and power plants, and some large orders from this source are expected within the next few months.

Plans and specifications are being prepared by F. A. Dallyn, consulting engineer, 71 King Street West, Toronto,

and tenders will be called in about a month for new waterworks and sewage systems to be installed at Blind River, Ont., to cost between \$200,000 and \$250,000.

Town Council, Glencoe, Ont., is having plans prepared by F. A. Dallyn, consulting engineer, 71 King Street West, Toronto, for waterworks plant and system to cost \$70,000.

Loretteville, Que., will install new waterworks and sewage plants to cost \$200,000. Langlais, Ricard & Royer, 126 St. Peter Street, Quebec, are engineers. Bids are being received by E. A. Martel, secretary, municipal council.

Springer Lock Works, Coleman Street, Belleville, Ont., will build a two-story addition, 40 x 60 ft., to cost \$10,000.

W. E. Dillon Co., Ltd., 189 George Street, Toronto, manufacturer of sheet metal products, etc., will build a two-story addition, 35 x 56 ft.

A. Mason, 130 McRoberts Avenue, Toronto, has let contract to W. H. Little, 63 Edna Avenue, for erection of a one-story foundry, 80 x 200 ft., brick construction.

Brantford Roofing Co., 22 Sydenham Street, Brantford, Ont., has let contract to Schultz Construction Co., Ltd., local, for an addition to its plant.

Western Canada

British Columbia Refractories, Ltd., 265 Water Street, Vancouver, B. C., has let contract to A. Roger Contracting Co., 744 Hastings Street West, for a plant to cost \$40,000.

Foreign

MUNICIPAL COUNCIL, Moscow, Russia, has plans for an automobile manufacturing plant to cost close to \$12,000,000, to specialize in production of cars of light type, with facilities for output of approximately 10,000 automobiles per year. A special commission will be formed to purchase machinery, including equipment in United States.

Director of gas works, Zurich, Switzerland, has been authorized to have plans drawn for extensions and improve-

ments in artificial gas plant, including installation of improved type ovens, reconstruction of gas-coke division, facilities for coal and coke-handling, storage, etc., and other work, to cost about \$1,350,000. American Consulate, Berne, Switzerland, Charles E. Lyon, commercial attaché, has information regarding project.

Aluminum Co. of Italy, Marbhera, near Venice, Italy, officially known as Societa Italiana dell' Alluminio-Milano, has arranged for increase in capital from 1,000,000 to 80,000,000 lire, a considerable portion of proceeds to be used for extensions and improvements in hydroelectric power facilities, electric furnaces and other departments. Company has secured rights to process for treating bauxite and pyrite minerals in electric furnaces. Main offices are at Milan.

Supreme Council of National Economy, Petrograd, Russia, has plans under advisement for construction of a new graphite refinery in Ukraine. Information at American-Russian Chamber of Commerce, 143 West Fifty-seventh Street, New York.

Government Railways of New Zealand, Wellington, is asking bids until June 25 for machine tools and other equipment, including four milling machines, three boring mills, one is to be vertical type, two screening and mixing machines, one face grinding machine, welding machines, rivet heaters, pipe and tube bending machines, etc.

Oslo Gas & Electricity Works, Oslo, Norway, known as Oslo Gas og Elektricitetsverker, is disposing of bond issue of \$6,000,000 in United States, a portion of proceeds to be used for extensions and improvements. H. Horn is director general.

San Salvador Electric Light Co., San Salvador, Salvador, has acquired additional properties suitable for hydroelectric power development and will complete plans soon for a station with capacity of 4500-hp. Extensions will be made in transmission lines.

P. Schreiner sen. & Co., Oslo, Norway, request catalogs describing brazing, welding and cutting equipment for iron, steel and metals.

NEW TRADE PUBLICATIONS

Board Drop Hammers.—Erie Foundry Co., Erie, Pa., has issued a 16-page bulletin, No. 160, describing the various types of construction regularly furnished, including the four-roll hammers and those with inserted guide box-section frames, and picturing installations of the several types.

Heat Control.—Brown Instrument Co., Philadelphia. 24-page illustrated booklet entitled "How the Other Fellow Does It," describing 20 installations, some of them in unusual applications, of automatically controlled heat-treatment furnaces.

Are Welders.—Fusion Welding Corporation, 103rd Street and Torrence Avenue, Chicago. Bulletin of four pages devoted to the Fuzon flexible arc welder, with description of the operation, control and other features of the job. Three models are available with welding ranges going up to 300, 400 and 600 amp. respectively.

Heating Resistors.—Monitor Controller Co., Baltimore. Bulletin 111 of eight pages illustrates and describes Monitor resistors in three groups: Edgewound for highest current values; hexwound for intermediate current values; smoothwound for lowest current values. The units are designed for heavy-duty service and are stated to be unusually compact, light and practically unbreakable.

Air Filters.—National Air Filter Co., 5130 Ravenswood Avenue, Chicago. Folder illustrated and describing a set of air filters installed in a large rolling mill. Six units are designed to clean a total of 300,000 cu. ft. of air a minute, for ventilation of mill motors and motor-generator sets.

Dust Problems.—Dust Recovery, Inc., 15 Park Row, New York. Bulletin No. 1 of 36 pages is devoted to an analysis of dust problems, the selection of dust-collecting equipment and methods of testing that equipment. There are a number of line drawings and several pages of tables dealing with the matter of cleaning the air of dust.

Tube and Rod Straighteners.—Torrington Mfg. Co., Torrington, Conn. Two-page folder giving standard specifications and a description of a roll-type straightener for tubes and rods.

Recording Wattmeters.—Bristol Co., Waterbury, Conn. Catalog 1502 of 28 pages illustrates and describes a complete line of wattmeters for a wide variety of

requirements. Charts of various descriptions are illustrated, as well.

Direct-Current Heavy-Duty Motors.—Reliance Electric & Engineering Co., Cleveland. Bulletin 202 of eight pages illustrates and describes heavy-duty motors of type 7, fitted with ball and roller bearings. The description is quite complete, including dimensioned sketches for the various sizes.

Airport Lighting Equipment.—Crouse-Hinds Co., Syracuse, N. Y. Bulletin 2108, showing the necessary equipment for the guidance of night flying. Course lights, field beacons, boundary lights, obstacle lights and various special illuminators, such as ceiling projectors, are described.

Globe and Gate Valves.—Wellman-Seaver-Morgan Co., Cleveland. Bulletin No. 89, 20 pages, describes and illustrates a new line of Supertest globe and gate valves having bodies and bonnets of forged steel. Advantages claimed include simplicity of design, demountable cages, cage and seats integral, all parts interchangeable and easily removable without removing the valve bodies from the line. Gate valves are made from 1 in. to 6 in. and upward and globe valves from ½ in. to 2 in. and upward.

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